

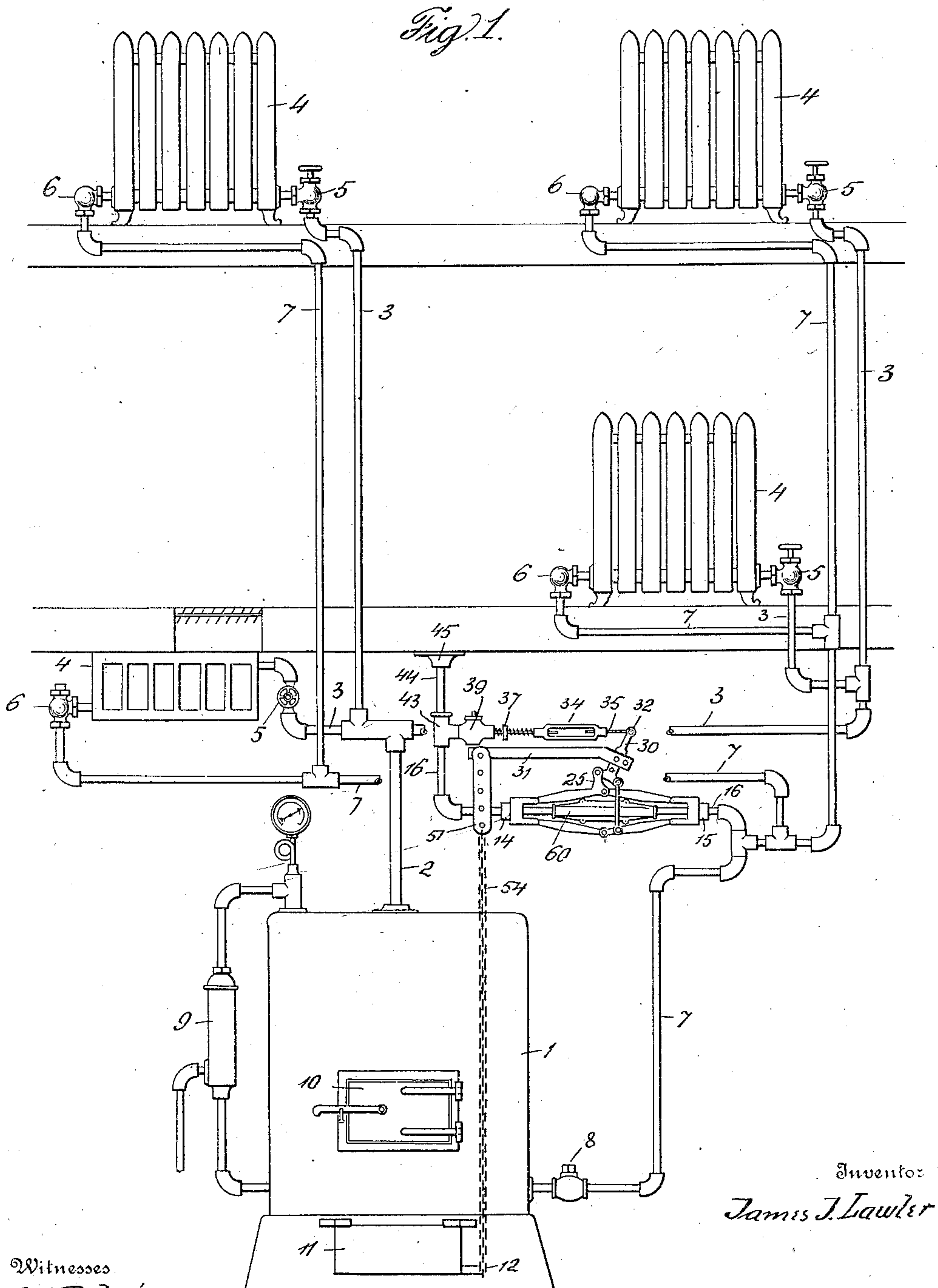
No. 889,382.

PATENTED JUNE 2, 1908.

J. J. LAWLER.
HEATING SYSTEM.

APPLICATION FILED MAR. 18, 1907.

2 SHEETS—SHEET 1.



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Fig. 2.

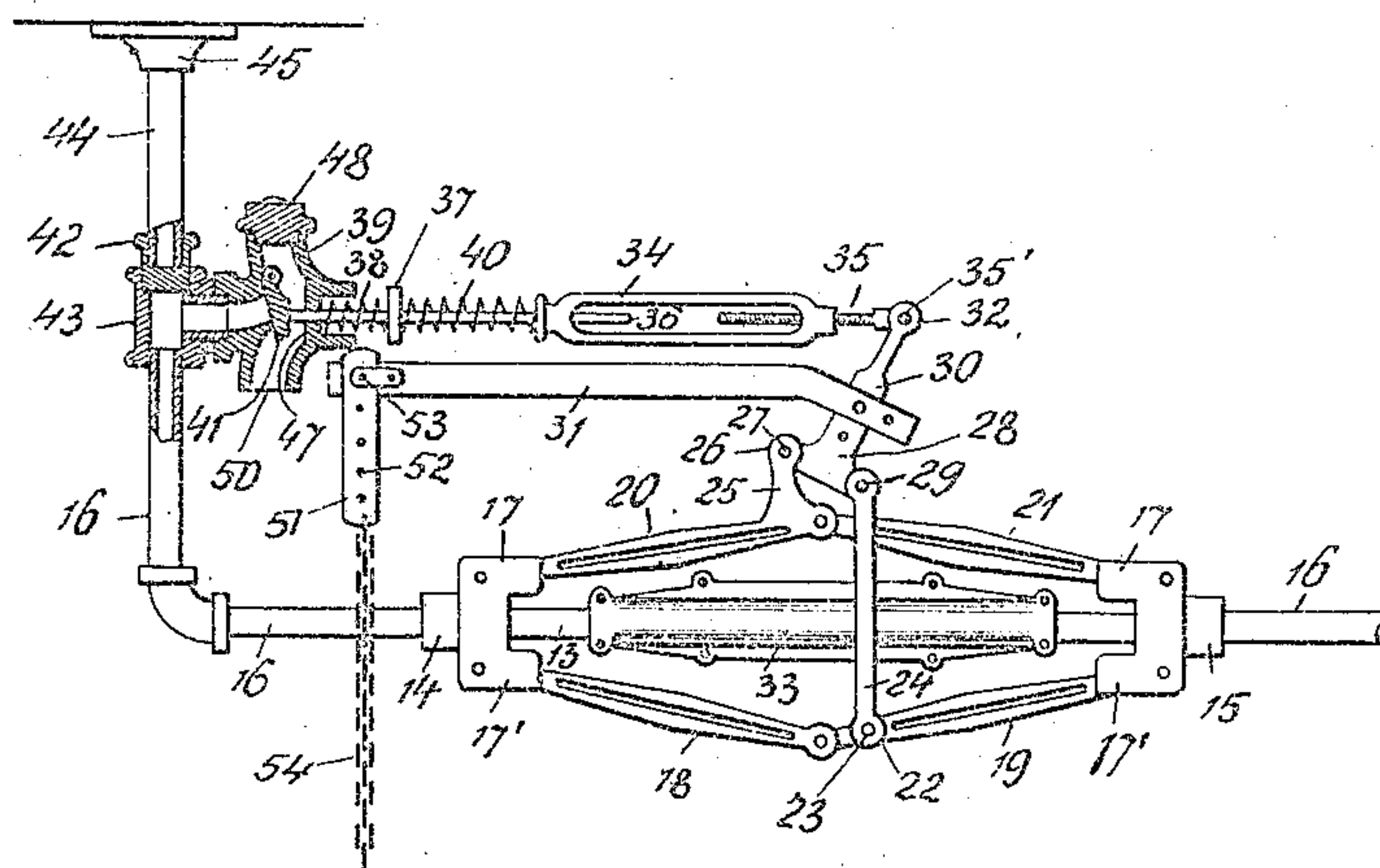
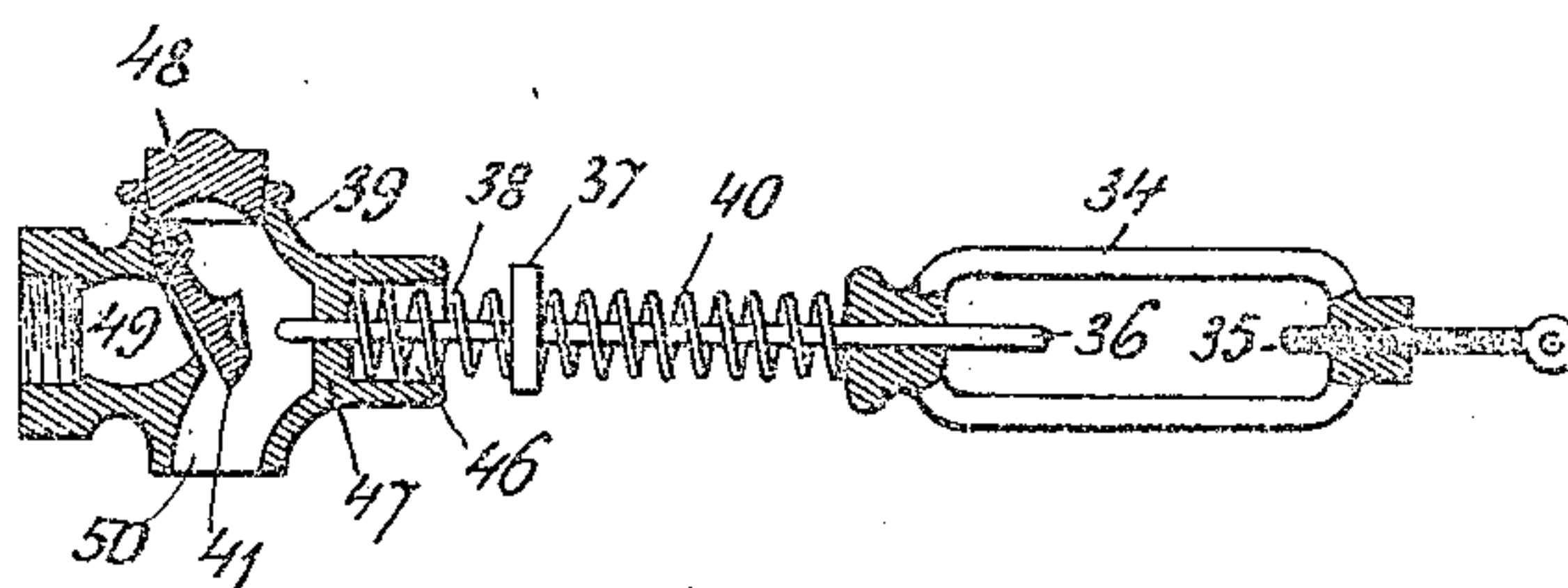


Fig. 3.



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UNITED STATES PATENT OFFICE

JAMES J. LAWLER, OF MOUNT VERNON, NEW YORK.

HEATING SYSTEM.

No. 889,882.

Specification of Letters Patent.

Patented June 2, 1908.

Application filed March 18, 1907. Serial No. 362,865.

To all whom it may concern:

Be it known that I, JAMES J. LAWLER, a citizen of the United States, and resident of the city of Mount Vernon, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Heating Systems, of which the following is a specification.

My invention relates to steam heating apparatus and has for its objects, first, to provide a system by which it is possible to operate said apparatus under a partial vacuum or above atmospheric pressure; second to secure a perfect circulation of the steam through the system without the use of air valves on the radiators; third, to dispense with the use of ejectors, pumps, vacuum tanks or other auxiliary power to secure circulation; and fourth, a perfect and automatic control or regulation of the supply of steam to the radiators as well as the automatic discharge of air from the heating system.

My invention is fully shown in the accompanying drawings, in which

Figure 1 is a diagrammatic view of a small heating system in a building; Fig. 2 is an enlarged detail view of the thermostat regulator connected up with the single air valve used, the valve being closed, and Fig. 3 is an enlarged view of the said air valve and operative connection, the valve being open.

The generator may be a steam boiler 1 of any ordinary construction.

The steam supply 2 is at the usual point of outlet of the boiler and branches out in several directions connected with the main risers 3 which feed the heaters, herein shown in the form of radiators 4. The radiators are equipped each with ordinary controlling valve 5 at the inlet end, and with a check valve 6 at the outlet end for the purpose of preventing condensation or steam backing up into the radiators when the controlling valve 5 is closed. The return pipe 7 is pitched so that any and all condensation is returned to the boiler by gravity. Both the supply pipe 3 and return pipe 7 in Fig. 1, are broken away on the left side above the boiler for the sake of clearness of the drawing. A check valve 8 on the return pipe is placed near the boiler as usual.

9 is an automatic constant level water feed, which I prefer to use, though its use forms no part of the present invention.

The boiler has the usual furnace door 10

and a horizontally suspended draft door 11 having an extending arm 12 by which it may be opened or closed. Above and adjacent to the boiler at a suitable point I place a thermostat regulator 60 for which Letters Patent were granted to me on July 10, 1906, No. 825,328, and which I will briefly describe as follows, reference being had to Fig. 2 of the drawings.

A brass or other suitable metallic tube 13 is screwed between two fittings 14—15 provided with threads at opposite ends to connect said fittings with the air discharge pipe 16 which is connected to the return pipe 7. These two fittings are provided with webs 17—17' at diametrically opposite sides into which the flat ends of the arms closely fit and articulate; a bolt acts as a pivotal bearing. The arms 18—19—20—21 are cruciform in cross section for the purpose of making them light and rigid. All of the four arms are of exactly the same length, two being connected with each other by a knuckle joint as shown, and, when thus connected each set or pair of arms form an obtuse angle on each side of the tube 13. One arm 19 is provided with a flattened disk 22 perforated for the passage of a screw or bolt 23 which connects two curved straps 24 to said arm. Arm 20 has an outwardly extending lug 25 provided with two parallel disks 26, provided with a bolt 27.

28 is a link which is connected to the lug 25 to form a knuckle joint with the two curved straps 24 to which it is connected by a bolt 29. The link 28 has an extension upon which a lever 31 is mounted, said extension terminating some distance from the lever in an eye or flat perforated disk 32, this extension of the link being a departure from the said Letters Patent mentioned hereinbefore; and for the purpose of preventing any possible lateral movement in the tube 13, I provide a thin tubular jacket 33 made in halves and fitting snugly on the tube. To provide a double regulation means, I extend the link 28, as described, so as to connect it with a turn buckle 34 by means of the connecting rod 35 upon which the turn buckle is adjustable. A screw or bolt 35' connects rod 35 with the link extension; the other end of the turnbuckle has a sliding fit with the rod 36. Upon this latter rod I fasten a disk 37 at a suitable point for the purpose of affording a shoulder for the spring 38, which spring at its other end has a bearing in the

air outlet valve 39, and also affords a bearing for one end of the spring 40 which presses outwardly against the turnbuckle. These two springs are of different tension, the one seating in the valve 39 being the weaker of the two for the purpose hereinafter set forth. The rod 36 is of sufficient length to extend into the air valve a suitable distance so that when pressed forward by the turnbuckle and spring 40, the point of it will press against the clapper 41.

The air valve 39 is connected with the thermostatic regulator as shown; I prefer to give rigidity to the air valve by using a blind bushing or plug 42 in a T 43, which bushing is screwed upon a pipe 44 fastened to the ceiling or other support by means of a flange 45, though it is obvious that any other simple way of keeping the air valve in an upright position and on a line with the spring rod and turnbuckle will answer the purpose.

The thermostat regulator is connected with the return pipe by the air discharge pipe 16 which is carried over adjacent to the boiler in such a position that the door operating lever 31 will be on a vertical line above the extension arm 12 on the draft door, the thermostatic regulator being so placed that no water of condensation will enter it.

The air valve 39 is recessed, at 46, for the spiral spring 38, a perforated wall 47 affording a bearing for the rod 36. The clapper 41 may be of ordinary construction, but I prefer to countersink it on the back on a line with the rod 36 so that when said rod is pressed against the clapper to close it tightly, the pressure will be at right angles. 48 is the cap for the air valve.

49 is the valve seat. 50 is the outlet. The free end of the door operating lever 31 is adjustably connected with a flat metal strip 51 having a series of perforations 52 adapted to be engaged by a pin 53 of the lever. A chain 54 connects the flat strip with the extension arm 12 on the draft door.

Such being the construction the operation is as follows: Before starting fire in the boiler the lever 31 on thermostat regulator is connected by chain to the draft door extension 12 of the boiler, and holding the same in an open position while the clapper of the air valve 39 is free to act the turnbuckle being regulated so that the point of rod 36 does not touch it. The thermostat regulator and air valve being connected on the end of the main return from all the radiators, there can be no action in the regulator until steam has passed through one or more of the radiators and filled also the main return pipe. As the steam leaves the boiler, it flows through the various supply pipe and risers, and, forcing the air contained in the pipes before it through the radiators and into the return lines from which it escapes through air discharge pipe 16 and air valve 39. After the

steam has filled the mains and such radiator that is in use, it moves to the air outlet valve 39, but before the steam has completely overcome the atmospheric pressure by escaping from valve 39 its heat acts on the tube 13 of the regulator, which expands and causes the arms to move towards the center or inward whereby the lever 31 is actuated by the strap arms 24 pushing outward against the lever link 28 at bottom, the arm simultaneously pulling the upper end of said link inward, thus producing a compound lever movement which causes the free end of the lever 31 to be lowered. This movement closes the draft door 11 and also causes the turnbuckle to be pressed inward against the spring 40 and indirectly against the rod 36 which, pressing against the clapper valve keeps it positively closed against the escape of steam and sealing the system against atmospheric pressure yet permitting a further and independent movement of the lever 31 as may be desired. As the steam is condensed in the heating pipes and radiators, the condensation travels back to the lower part of the boiler by gravity through the return pipe. The air once being expelled from the heating system by the steam, the apparatus can be run under partial vacuum, and the draft door on the boiler can be so adjusted as to maintain the desired temperature below 212 degrees, while it can also be adjusted by means of the flat strip adjustment on the lever 31 and chain to operate under steam pressure above that of the atmosphere at times when a temperature of more than 212 degrees is desired,—as in the case of severe cold weather,—the lever 31 being free to move from increased temperature of thermostat tube.

When another radiator is turned on, the air is forced out by the advancing steam through the return pipes to the thermostat regulator where it is locked, and owing to the difference in temperature the tube 13 contracts, the arms are pushed outward causing the link and its extension and connections to travel away from the air check valve which is then free to open to the escaping air. When the pipes are freed and the steam passes through the tube of the thermostat regulator, it again expands and seals the system in the same manner as hereinbefore described. If however there is an increased demand for steam in the system, by reason of additional radiators being turned on, the temperature will lower in return pipes and thereby allow the thermostatic tube to cool and contract resulting again in opening the draft door to fire and allowing the boiler to supply the extra necessary amount of steam.

It will be seen from the foregoing description, that the lever operating the door and the link operating the air check valve, act simultaneously and in unison, one however

having a much greater travel than the other, so that the draft door can be opened or closed and continued in either position without affecting the air valve which can be so set that it will remain closed until too great a movement of the extended link causes rod 36 to be drawn away from the clapper valve.

Having now fully described my invention what I desire to secure by Letters Patent is:

1. In a steam heating system, a steam generator, a draft door therefor, a radiator, a steam supply pipe and a return pipe both in communication with the generator and radiator, and an air discharge pipe in communication with said return pipe having a thermostatic device interposed therein adapted to be operated by steam in the air discharge pipe, an air valve arranged to control the passage through the air discharge pipe, means connected to and operable by said thermostatic device for operating the said draft door and regulating the draft to the generator and closing said air valve.

2. In a steam heating system, a steam generator, a draft controlling door therefor, a radiator, a supply pipe and a return pipe establishing a circuit between the generator and the radiator, an air outlet valve in communication with the return pipe, a thermostatic device interposed between the radiator and the air outlet valve, and means operated by said thermostatic device for closing the air valve and simultaneously operating the draft door for regulating the draft of the generator when the return pipe is freed of air.

3. In a steam heating system, a steam generator, a draft controlling door therefor, a steam radiator, a supply pipe and a main return pipe establishing a circuit between the generator and the radiator, an air discharge pipe having a thermostatic device therein adapted to be operated by steam in the air

discharge pipe, an air outlet valve arranged to control the passage through said air discharge pipe, the said thermostatic device in the air discharge pipe acting in its expansion and contraction to automatically close the air outlet valve when the return pipe has been freed of air and simultaneously operate the draft door to regulate the draft of the generator.

4. In a steam heating system, a steam generator, a draft controlling door therefor, a steam radiator, a steam supply pipe and a return pipe establishing a circuit between the generator and the radiator, an air discharge pipe having a thermostatic device interposed therein adapted to be operated by steam in said air discharge pipe, a normally open air outlet valve arranged to control the passage through said air discharge pipe, and means operable through the medium of said thermostatic device and acting simultaneously to close the air outlet valve and operate the draft door to regulate the draft of the steam generator.

5. In a steam heating system, a steam generator, a draft door therefor, and a steam radiator, a steam supply pipe and a steam return pipe establishing a circuit between the generator and the radiator, an air outlet valve in communication with the return pipe, and a thermostatic regulator acting under the action of steam to close the air outlet valve and simultaneously operate the draft door to regulate the draft of the generator.

Signed at New York city in the county of New York and State of New York this 14th day of March A. D. 1907.

JAMES J. LAWLER.

Witnesses:

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EDGAR M. GREENBAUM.