J. M. McKEOWN.

REGULATOR FOR HOT WATER HEATING SYSTEMS.

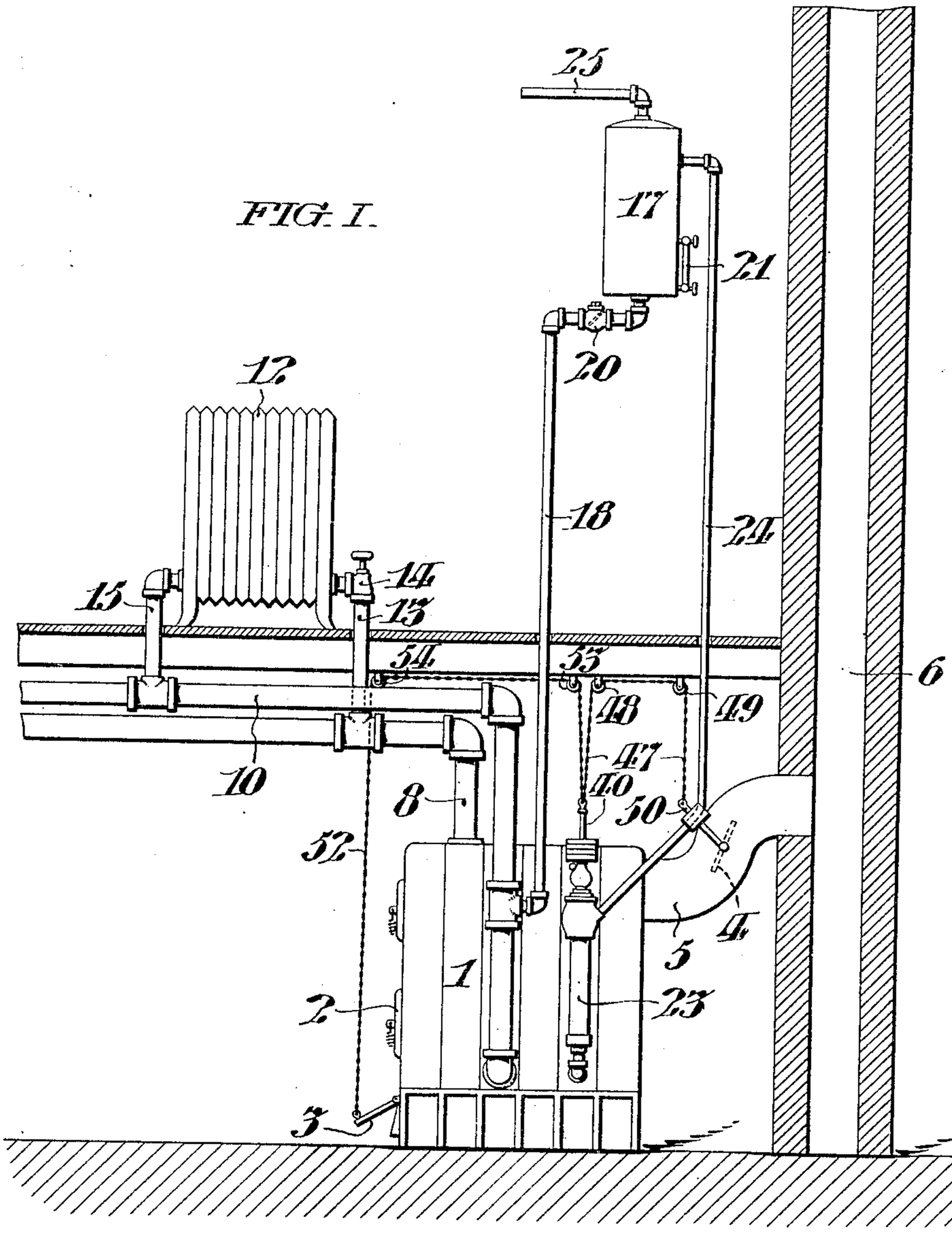
APPLICATION FILED DEC. 28, 1907.

913,033.

Patented Feb. 23, 1909.

2 SHEETS—SHEET 1.

FIG. I.



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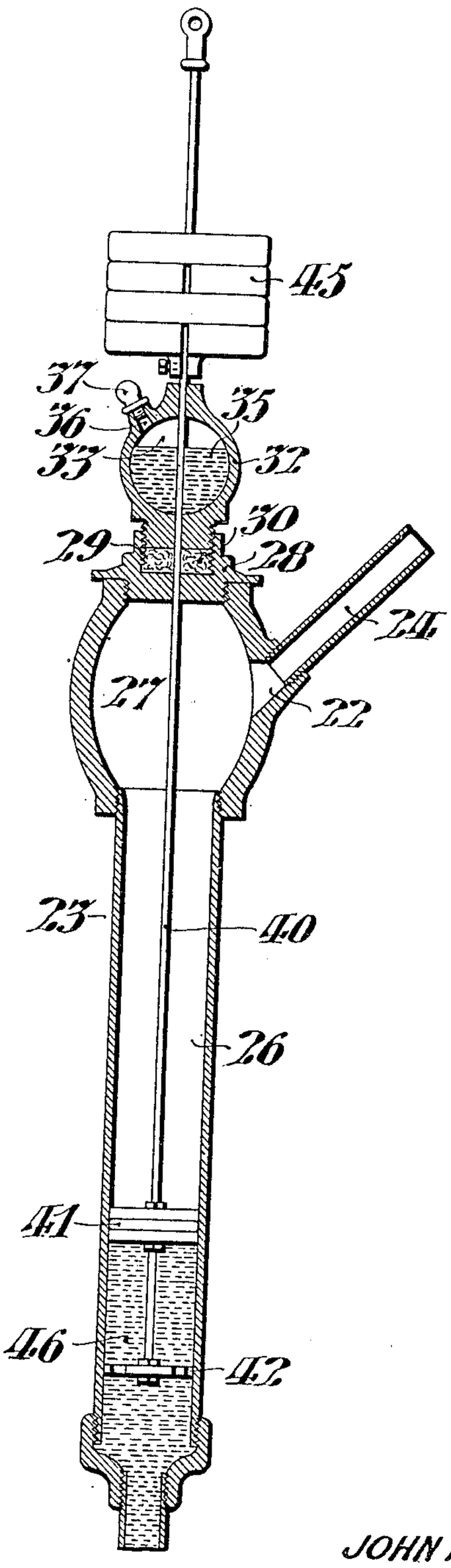
2 SHEETS—SHEET 2.

FIG. II.



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UNITED STATES PATENT OFFICE.

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REGULATOR FOR HOT-WATER HEATING SYSTEMS.

No. 913,033. Specification of Letters Patent. Patented Feb. 23, 1909.

Application filed December 28, 1907. Serial No. 408,370.

To all whom it may concern:

Be it known that I, JOHN MICHAEL McKEOWN, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Improvement in Regulators for Hot-Water Heating Systems, whereof the following is a specification, reference being had to the accompanying drawings.

My invention relates to devices for automatically controlling both the temperature and pressure of water in a heating system comprising a boiler furnace, and radiators and an overflow tank connected with the boiler.

It is an object of my invention to provide a regulator which when adjusted to a certain normal pressure shall prevent the water in the system from exceeding that pressure while permitting a limited range of expansion of the water, and, when the water exceeds said range of expansion shall open a vent port and permit the escape of water from the system until the normal pressure is reached.

As hereinafter described, my invention comprises a vertically disposed cylinder connected with the boiler at its lower end and having a vent port at its upper end leading to said overflow tank; a piston arranged to reciprocate in said cylinder and control said port; a plunger carried by said piston, and, means operatively connecting said plunger with both an air inlet damper and a smoke outlet damper of the boiler furnace, whereby the position of said dampers and consequent temperature of the water is automatically determined by the position of said piston. Said plunger is provided with an adjustable divisional weight, whereby the water pressure in the system may be variably determined, and, the length of traverse of the piston in said cylinder before it opens the vent port aforesaid determines the normal range of expansion of the water in the system which may occur without opening said vent port.

My invention comprises the various novel features of construction and arrangement hereinafter more definitely described.

In the accompanying drawings; Figure I, is a diagrammatic sectional view of a house, showing in elevation a heating system conveniently embodying my improvement. Fig. II, is a central vertical sectional view of the regulator shown in Fig. I.

In said drawings, the boiler 1, which is of the sectional type, is provided with the furnace door 2, the air inlet damper door 3, and the smoke outlet damper 4. Said damper 4, is arranged to control the smoke flue 5, leading to the chimney 6. The main supply pipe 8, is arranged to direct the hot water from the top of the boiler through the system and the cooled water is returned through the pipe 10, into the bottom of said boiler. The radiator 12, is connected at its intake end with said supply pipe 8, by the pipe 13, controlled by the valve 14, and its opposite end is connected by the pipe 15, with the return pipe 10.

The boiler is connected with the overflow tank 17, by the pipe 18, controlled by the check valve 20, arranged to permit the flow of water from said tank 17, but prevent its return thereto. Said tank 17, is conveniently provided with the water gage 21, and is connected with the vent port 22, of the regulator 23, by the pipe 24. Said tank 17, is also provided with the discharge pipe 25, through which any excess of water may escape. As shown in Fig. II, said regulator 23, comprises the cylinder 26, having its upper end terminating in the bowl 27, which is provided with the screw cap 28, comprising the stuffing box 29, inclosing the packing 30. Said packing 30, is compressed by the screw gland 32, which comprises the chamber 33, arranged to be charged with oil 35, through the inlet 36, normally closed by the screw plug 37. The plunger 40, carrying the piston 41, and the perforated follower 42, below said piston, extends through said stuffing box 29, and oil chamber 33, and is provided exterior thereto with a series of detachable divsional weights 45, whereby any desired pressure of the water 46, beneath the piston 41, may be counterbalanced.

As shown in Fig. I, the upper end of the plunger 40, is operatively connected with both the dampers 3 and 4, so that said dampers are automatically shifted in accordance with the movement of said piston 41. Said plunger 40, is connected with said smoke damper 4, by the chain 47, which extends over the sheaves 48 and 49, to the lever 50, of said damper 4. Said plunger is also connected with the air inlet damper 3, by the chain 52, extending over the sheaves 53 and 54.

The regulator above described, operates as

follows:—The dampers 3 and 4, being opened as shown in Fig. I, the fire in the furnace increases and raises the temperature of the water so that the expansion of the latter raises the piston 41, in the cylinder 26, and thus permits said dampers to partially close and to diminish the draft through the furnace. The temperature of the water being thus lowered the water contracts beneath the piston 41, and the latter is correspondingly lowered by the weight 45, to again open said dampers. The cylinder 26, is made of such length as to permit such expansion and contraction of the water as will effect the control of said dampers as above described without raising said piston into the bowl 27. However, upon an abnormal increase in the pressure of water beneath said piston 41, the latter is uplifted into the bowl 27, permitting the water 46, to escape through the vent port 22, until the water pressure beneath said piston 41, is equal to the weight 45; whereupon, the piston descends into the cylinder under pressure of said weight and guided by the follower 42. Whenever the water pressure in the overflow tank 17, exceeds that in the pipe 18, leading back to the boiler, the check valve 20, opens and permits the water to gravitate into said pipe 18, from said tank.

I do not desire to limit myself to the precise details of construction and arrangement herein set forth, as it is obvious that various modifications may be made therein without departing from the essential features of my invention as defined in the appended claims.

I claim:—

1. In a hot water heating system, the combination with a boiler furnace provided with an air inlet damper and a smoke outlet damper; of an overflow tank above the level of said boiler; a fluid pressure regulator comprising a vertically disposed cylinder in communication with said boiler at its lower end and having a bowl at its upper end provided with a vent port in communication with said tank; a piston arranged to reciprocate in said cylinder and bowl, arranged to permit the escape of water from said cylinder through said vent port when raised into said bowl; a follower below said piston, arranged to guide said piston into said cylinder; a plunger carried by said piston and connecting it with said follower; an adjustable weight on said plunger; means operatively connecting said plunger with both of said dampers, whereby said dampers are automatically adjusted in accordance with the movement of said piston, and, water is permitted to escape through said port from said boiler to said overflow tank when the water pressure exceeds that counterbalanced by said weight, substantially as set forth.

2. In a hot water heating system, the combination with a boiler furnace provided with an air inlet damper and a smoke outlet damper; of an overflow tank above the level of said system, and connected therewith; a fluid pressure regulator connected with the boiler, comprising a vertically disposed cylinder in communication with said boiler at its lower end and having a vent port in communication with said tank; a piston arranged to reciprocate in said cylinder to vary its capacity and to control the escape of water from said boiler through said vent port; a plunger carried by said piston; an adjustable weight on said plunger; arranged to maintain a constant pressure in said system; means operatively connecting said plunger with both of said dampers, whereby said dampers are automatically adjusted in accordance with the movement of said piston, and water is permitted to vary in volume until the maximum capacity of said cylinder is attained, and to then escape through said port from said boiler to said overflow tank, substantially as set forth.

3. In a hot water heating system, the combination with a boiler furnace; of an overflow tank; a regulator comprising a cylinder in communication with said boiler and having a vent port leading to said tank; a piston arranged to reciprocate in said cylinder, to vary its capacity and to control said port, whereby water is permitted to vary in volume at a constant pressure within said cylinder to a predetermined limit, and to then escape through said port; a plunger carried by said piston; an adjustable weight on said plunger, whereby said water is maintained at a constant pressure, substantially as set forth.

4. In a hot water heating system, the combination with a boiler furnace; of a fluid pressure regulator comprising a vertically disposed cylinder in communication with said boiler at its lower end and having a vent port at its upper end; a piston arranged to reciprocate in said cylinder to vary its capacity and to control said port, whereby water is permitted to expand within said cylinder and to escape through said port when said piston is raised to open said port by water pressure exceeding that counterbalanced by said weight, substantially as set forth.

5. In a hot water heating system, the combination with a boiler furnace; of a fluid pressure regulator comprising a vertically disposed cylinder in communication with said boiler at its lower end and having a bowl at its upper end provided with a vent port; a piston arranged to reciprocate in said cylinder and control said port; a plunger carried by said piston; an adjustable weight on said plunger; and, a follower connected with said piston by said plunger, whereby water is permitted to escape through said port when said piston is raised from said cylinder into said bowl by water pressure exceeding that coun-

terbalanced by said weight, and, said piston is guided by said follower from said bowl into said cylinder under pressure of said weight when the water pressure is equalized, substantially as set forth.

6. In a hot water heating system, the combination with a boiler furnace; of a fluid pressure regulator comprising a vertically disposed cylinder in communication with said boiler at its lower end and having a bowl at its upper end provided with a vent port; a piston arranged to reciprocate in said cylinder and control said port; a plunger carried by said piston; an adjustable weight on said plunger; a follower connected with said piston by said plunger; a stuffing box at the upper end of said bowl surrounding said plunger; and, a gland for said stuffing box comprising an oil chamber surrounding said plunger, whereby water is permitted to escape through said port when said piston is raised from said cylinder into said bowl by water pressure exceeding that counterbalanced by said weight, and, said piston is guided by said follower from said bowl into said cylinder under pressure of said weight when the water pressure is equalized, substantially as set forth.

In testimony whereof, I have hereunto signed my name at Philadelphia, Pennsylvania, this 24th day of December, 1907.

JOHN MICHAEL McKEOWN.

Witnesses:
JOHN A. STEER,
E. B. MORRIS, Jr.