No. 753,324. PATENTED MAR. 1, 1904.

J. R. SHANKLIN.

STEAM HEATING SYSTEM.

APPLICATION FILED AUG. 24, 1903.

NO MODEL.

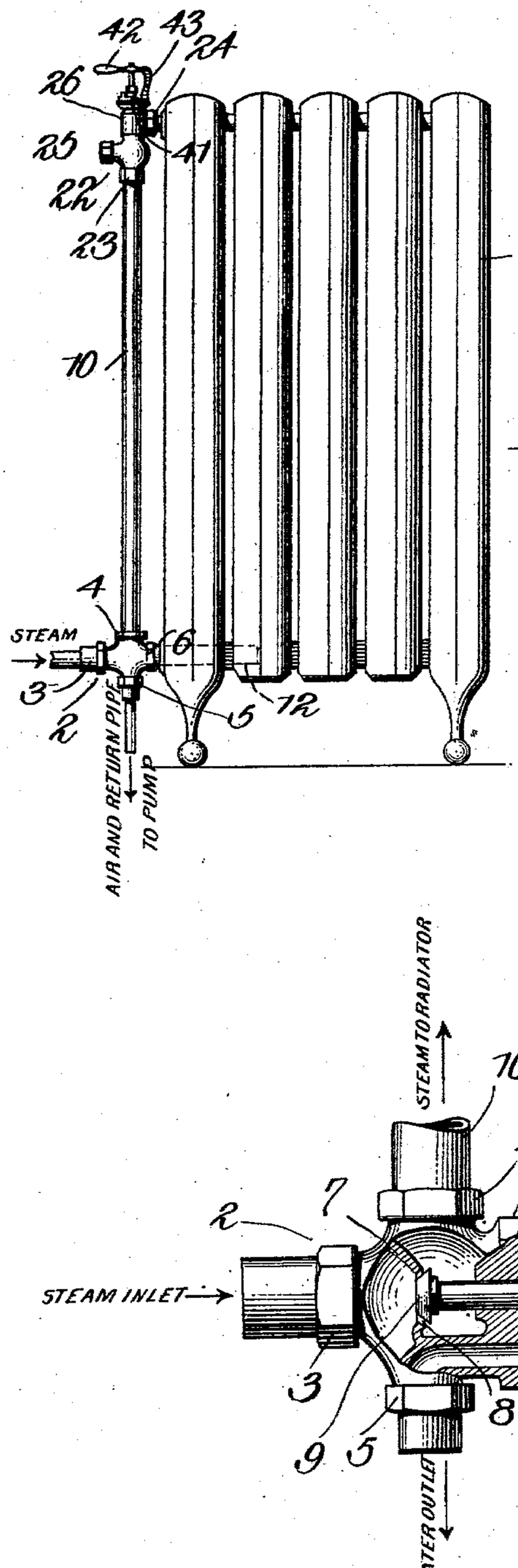

Fig. 1.

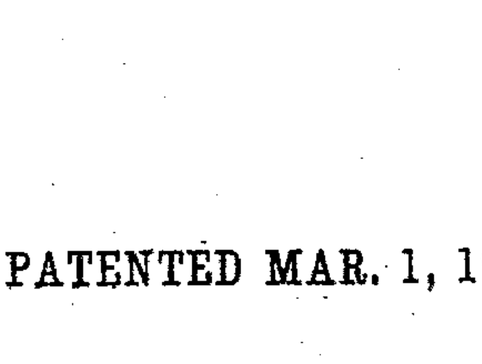

Fig. 4.

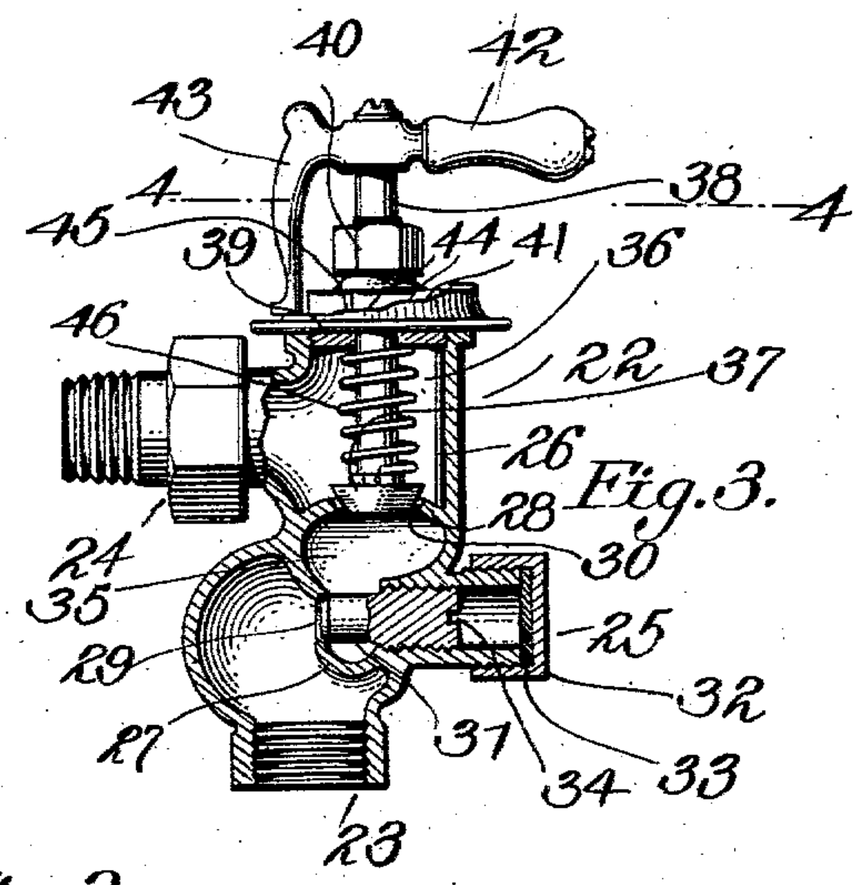

Fig. 3.

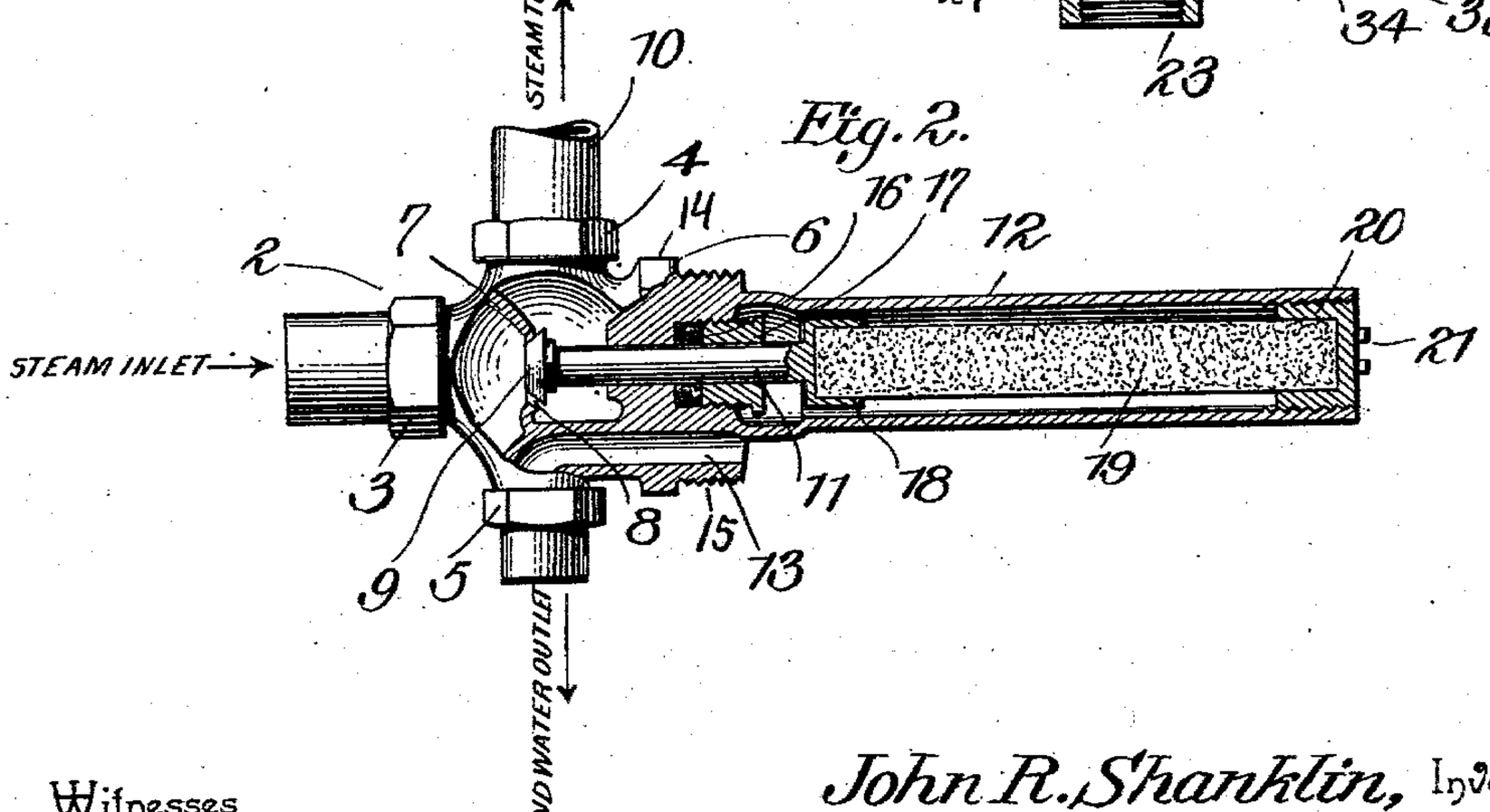

Fig. 2.

Witnesses
E. K. Stewart.
Wm. Bagger.

John R. Shanklin, Inventor.
by Church & Co
Attorneys

No. 753,324. Patented March 1, 1904.

UNITED STATES PATENT OFFICE.

JOHN RICHARD SHANKLIN, OF CHARLESTON, WEST VIRGINIA.

STEAM-HEATING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 753,324, dated March 1, 1904.

Application filed August 24, 1903. Serial No. 170,632. (No model.)

To all whom it may concern:

Be it known that I, JOHN RICHARD SHANKLIN, a citizen of the United States, residing at Charleston, in the county of Kanawha and State of West Virginia, have invented a new and useful Steam-Heating System, of which the following is a specification.

This invention relates to steam-heating systems employing radiators.

The invention has for its object to regulate and control the passage of steam from the generator to the radiator and the return of the water of condensation and air to the pump, whereby the condense-water is eventually returned to the boiler or generator, said regulation and control being effected in part automatically by means of an automatically-operating thermostatic valve, in part manually by means of a valve conveniently accessible at all times and whereby the passage of steam under pressure into the radiator may be regulated or entirely shut off, and finally by means of a valve ordinarily non-accessible and which may be set so as to govern the maximum amount of steam permitted to pass to the radiator.

My invention with these ends in view consists in the improved construction, arrangement, and combination of parts, which will be hereinafter fully described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a diagrammatic view of a radiator of a system constructed in accordance with the principles of my invention. Fig. 2 is a sectional detail view of the automatically-operating thermostatic valve. Fig. 3 is a part-sectional view of the regulating-valve. Fig. 4 is a sectional view taken on the line 4 4 in Fig. 3.

Corresponding parts in the several figures are indicated by similar numerals of reference.

1 designates a radiator which may comprise any desired number of coils or sections and which is in all respects of ordinary construction.

2 designates a valve-casing having four branches 3, 4, 5, and 6, the bulb of the casing being provided with an interior web 7, having an opening 8, facing the branch 3 and constituting a seat for a valve 9. The branch 3, which is the steam-inlet, communicates through the opening 8 with the branch 4, with which is connected a pipe 10, carrying steam to the radiator.

The branch 6 of the valve-casing is bored for the passage of a stem 11, which carries the valve 9, and said branch has an integral tubular extension 12, below which the solid body of the valve-casing has a bore 13 for the passage of air and condense-water to the outlet, which is through the branch 5. The branch 6 has a wrench-seat 14, and it is externally threaded, as shown at 15, the tubular extension 12 and the exhaust-passage 13 being both included within the threaded portion of the branch 6. Said branch 6 is connected with the outer section of the radiator, and the tubular extension 12 may be extended through one or more of said sections, as will be readily understood.

In the bottom of the tublar extension 12 is formed a recess 16 for a packing-gland 17, which surrounds the valve-carrying stem 11. The inner end of said stem has a socket 18 for the reception of an expansible body 19, the extreme inner end of which is seated in a cap 20, which latter is exteriorly threaded and adjustable in the interiorly-threaded inner end of the tubular extension 12. Said cap 20 is provided with lugs 21, which may be conveniently engaged by a tool, whereby the said cap may be adjusted to thereby adjust the position of the valve 9 with relation to the opening or seat 8. The expansible body 19 constitutes, it will be observed, a thermostat, which is disposed within the casing or cage 12 and which when expanded by heat will effect the automatic closure of the opening 8 by the valve 9, and, reversely, when contracted by cold will withdraw the valve 9 from its seat, so as to admit of the passage of steam.

It will be observed that the device thus far described and which is connected with the radiator at the lower end thereof constitutes not only an automatically-operated thermostatic device for governing the passage of steam, but also an exit for the air and water of condensation eventually accumulating in the coils or sections of the radiator.

Suitably connected with the upper end of

the outer radiator-section is a regulator-valve comprising a casing 22, having four branches 23, 24, 25 and 26, the lowermost of which, 23, is connected by the pipe 10 with the branch 4 of the casing 2, said branch 23 thus constituting a steam-inlet. The casing 22 is provided with two interiorly-disposed webs or partitions 27 and 28, each having an opening 29 30, which said openings constitute valve-seats. The web 27 is disposed approximately vertically within the casing, and the seat or opening therein is closed by means of a valve 31, consisting of a stem which has threaded engagement with the interiorly-threaded branch 25, which latter is provided at its outer end with a cap 32 and a gasket or packing-ring 33, affording a tight joint. The valve 31 is provided with a notch 34, whereby when the cap 32 is removed it may be set, by means of a screw-driver or other suitable tool, so as to regulate the amount of fluid permitted to pass through the opening 29. When the valve 31 has been initially set, the cap 32 is restored and tightened, so as to prevent tampering with said valve. The passage of steam from the pipe through the web or diaphragm 27 and into the space or chamber 35 between the webs 27 and 28 is thus regulated by said valve. The space or chamber 36 above the web or diaphragm 28 communicates with the radiator through the laterally-extending branch 24, which has threaded connection with the upper end of the radiator-section. It will be observed that steam will be permitted to pass freely into the chamber 35 to the extent governed by the valve 31. The passage of steam from the chamber 35 and to the radiator is governed by a valve 37, seated in the opening 30 of the web 28 and mounted upon a stem 38, which extends through a cap 39, which forms a closure for the outer end of the branch 26 and for the chamber 36, located within said branch. This cap, which is provided with a wrench-seat 40, has screw-threaded connection with the branch 26, and it is provided upon its upper outer side with a peculiarly-constructed cam 41, which is concentric with the valve-stem 38. The latter is provided at its upper end with a handle 42, having a downwardly-extending foot 43, which is adapted to rest upon the upper side of the cap or upon the upper face of the cam 41, as may be desired. Said cam is divided into a plurality of steps 44 of gradually-increasing height and separated by inclined portions 45. A coiled spring 46, encircling the valve-stem 38, forces the latter and the valve carried thereby normally into engagement with the seat 30, this being the position occupied when the foot 43 is in contact with the upper surface of the cap proper. It will be seen that by rotating the valve-stem axially by means of the handle 42 the foot 43 may be gradually raised from one to another of the steps 44 until it attains the highest position at which the valve will be opened to the fullest extent, the intermediate steps serving to gage the degree of the opening, and hence to regulate the amount of steam permitted to pass by the valve 37 to the radiator.

From the foregoing description, taken in connection with the drawings hereto annexed, the operation and advantages of my invention will be readily understood by those skilled in the art to which it appertains. The thermostatic valve at the lower end of the radiator serves as a pressure-regulator and its casing also as an exit for the water of condensation. When the radiator is in use, the steam passing through the pipe 10 and through the opening or valve-seat 29 in the web 27 of the upper valve-casing 22 is checked by the valve 30, the amount of steam permitted to enter into the chamber 35, from which the valve 37 forms the outlet, being gaged and permanently determined by the valve 31. The occupants of the room in which the radiator is located may by manipulating the handle 42 regulate the admission of steam into the radiator, the maximum amount of steam being that which is permitted to pass by the valve 31. When the radiator becomes heated, the expansible body 19, constituting the thermostat, will be expanded, thus closing or partially closing the valve 9, and thereby shutting off or dimishing the steam-supply, as the case may be. The point at which the steam shall be entirely shut off by the action of the valve 9 may be initially determined by properly adjusting the cap 20, which is connected, as herein described, with the stem of said valve. When the radiator becomes cooler, the expansible body 19 contracts, thereby opening the valve and increasing the steam-supply. The water of condensation which accumulates in the bottom of the radiator will at all times find a ready outlet through the passage 13 to the branch 5 of the valve-casing 2, from whence it may be piped to the pump, as hereinbefore described.

Having thus described my invention, I claim—

1. In a steam-heating system, a thermostatic valve governing the passage of steam from the source of supply, said valve comprising a casing connected with, and having a cage extending laterally into, the lower part of a radiator, an expansible valve-carrying member within said cage, and an outlet for condense-water extending through said valve-casing and communicating with the interior of the radiator below the cage containing the expansible member.

2. In a steam-heating system, a valve-casing connected directly with the lower end of the radiator, a thermostatic valve within said casing controlling the passage of steam from the source of supply, and an exit for water of condensation extending through said valve-casing and communicating with the interior of the radiator.

3. In a steam-heating system, a radiator, a thermostatic valve connected with the lower end of said radiator and automatically governing the passage of steam from the source of supply, controlling means connected with the upper end of the radiator and comprising means for limiting the maximum steam-supply and additional manually-operated means for governing the supply to the regulator, and connecting means between said controlling means and the steam-exit of the casing containing the thermostatic valve.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN RICHARD SHANKLIN.

Witnesses:
W. G. BARRAR,
ISAAC LOEWENSTEIN.