No. 827,231. PATENTED JULY 31, 1906.

F. C. GOFF.

STEAM HEATING SYSTEM.

APPLICATION FILED JULY 24, 1905.

2 SHEETS—SHEET 1.

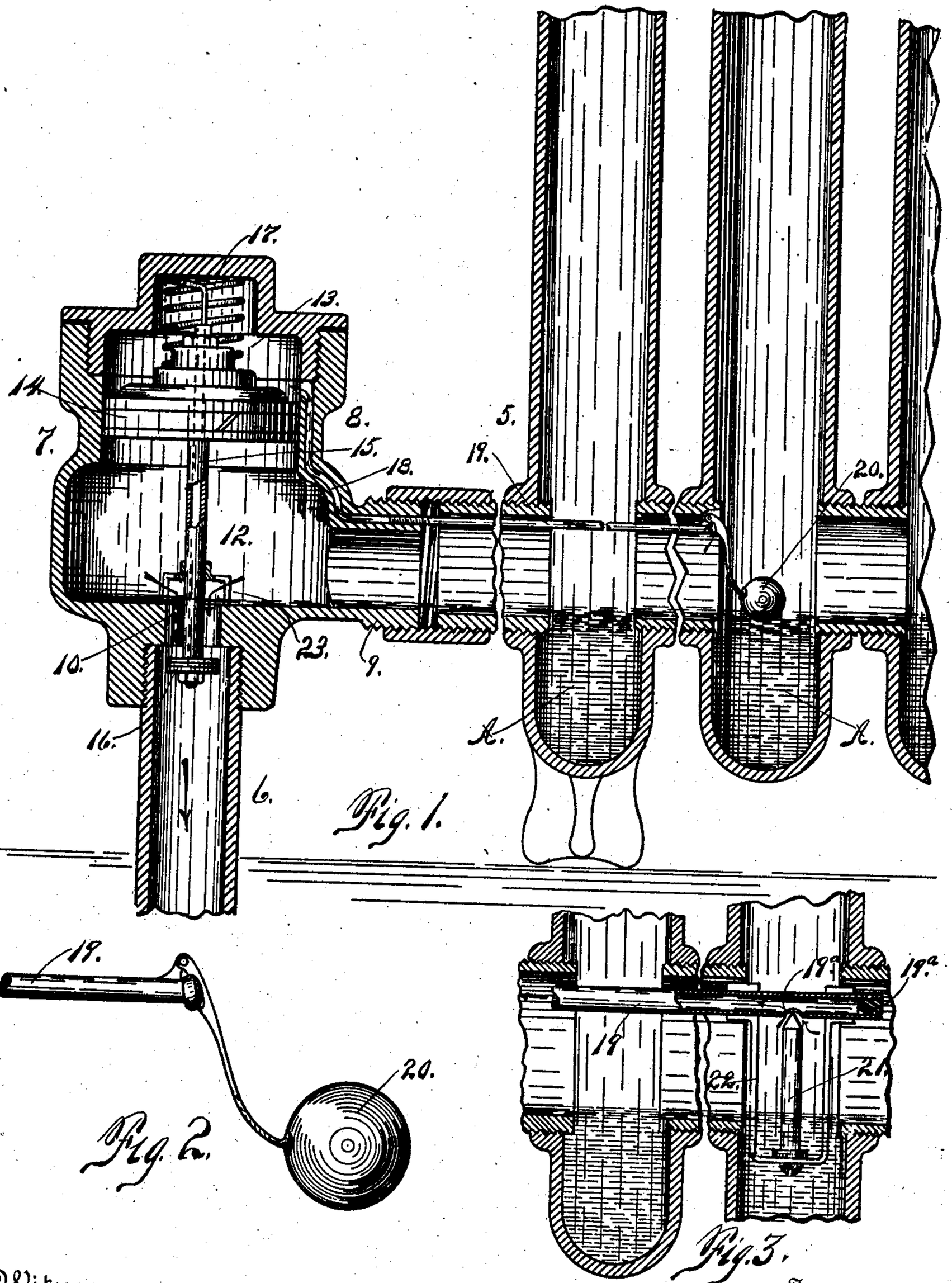

Fig. 1.

Fig. 2.

Fig. 3.

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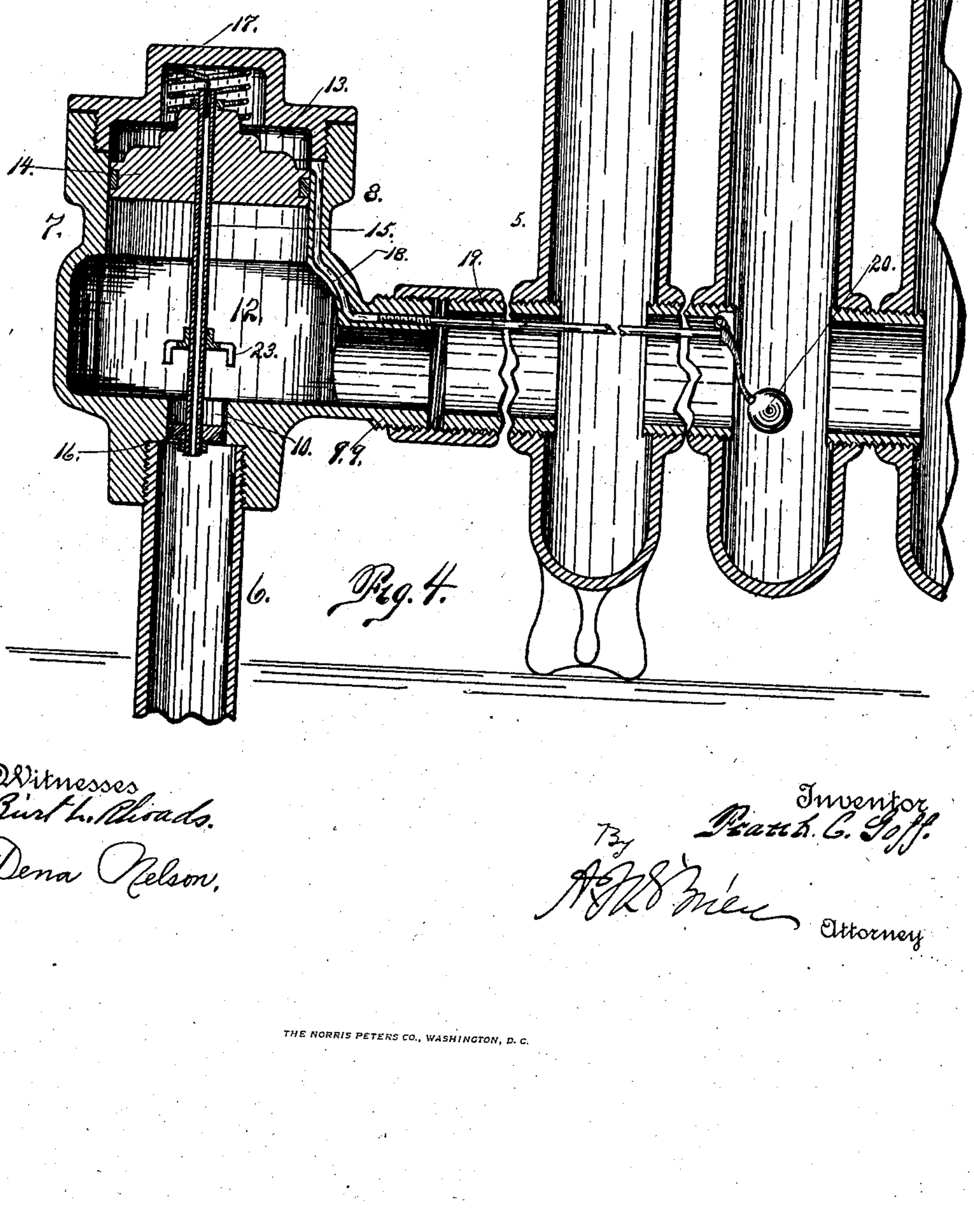

Fig. 4.

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UNITED STATES PATENT OFFICE.

FRANK C. GOFF, OF DENVER, COLORADO.

STEAM-HEATING SYSTEM.

No. 827,231. Specification of Letters Patent. Patented July 31, 1906.

Application filed July 24, 1905. Serial No. 270,899.

To all whom it may concern:

Be it known that I, FRANK C. GOFF, a citizen of the United States, residing in the city and county of Denver and State of Colorado, have invented certain new and useful Improvements in Steam-Heating Systems; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in fluid systems and valve mechanism for use therein.

The use of the invention will be described in this specification more especially in connection with a steam-heating system whereby the valve is automatically controlled from conditions within a radiator or radiating device of the system for the purpose of permitting the escape of the water of condensation therefrom, though it must be understood that the invention is not limited to this use.

The valve employed in connection with my improvement consists of a casing and a motor-controlled valve-piece acted on by means for holding the valve-piece open in the absence of fluid controlling influence. For instance, when the steam is shut off and the pressure within the radiator is no longer greater than that on the outer side of the valve the latter remains open, thus permitting the escape of any water of condensation and preventing the freezing of the water within the system. By virtue of my improvement the valve is normally closed when the system is under pressure, as of steam. This is true whether or not an exhauster is used in connection with the discharge or drainage conduit. In my improvement the motor is preferably a piston working within the casing and carrying a hollow stem with which the valve-piece is connected. This hollow valve-stem forms communication between the pressure-chamber or outer compartment of the valve-casing and the discharge or drainage conduit. Hence when the pressure-chamber is cut off from the radiating system and the pressure therein is less than in the chamber or compartment of the valve-casing on the outlet side of the radiator as well as within the radiator the result will be that the pressure of the system acting on the piston will close the valve against the action of the spring in the pressure-chamber. Now as soon as the pressure within the radiator is communicated to the pressure-chamber the pressure will be equal on both sides of the motor-piston and the spring within the pressure-chamber acting on the piston will open the valve-piece and allow the water of condensation to drain from the system.

In the construction shown in the drawings a conduit projecting into a radiator has its inner extremity normally closed by a float-valve. This conduit communicates with a passage formed in the valve-casing and communicating with the pressure-chamber. Now under normal conditions, or when there is no water of condensation within the system, the float-valve remains closed and the valve-piece controlling the drainage-port of the valve-casing is also closed, but as soon as any considerable quantity of water of condensation accumulates within the system the same will act upon the float-valve to open the same, thus allowing the pressure within the system to be communicated to the pressure-chamber, whereby the pressure will be equalized on both sides of the motor-piston and the valve-piece of my improved valve will be opened. As soon as the water has escaped sufficiently to allow the float to resume its normal position within the radiator this float will close the open extremity of the small conduit communicating with the pressure-chamber, and the piston will again be actuated to close the valve, thus preventing the escape of the steam or other heating agent from the system.

An important advantage of controlling the escape of the water of condensation from the conditions within the radiating device is that the controlling-valve or valve mechanism may be located at any distance from the radiating device within which the float is located. It is also true that the controlling-valve may, if desired, be located above the radiating device, providing the height is not greater than can be overcome by the pressure within the system and the force of the exhauster, if any, connected with the drainage-conduit, or either of these forces.

Having briefly outlined my improved construction, as well as the function it is adapted to subserve, I will proceed to describe the same in detail, reference being made to the

accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a fragmentary section illustrating a radiating device and showing my improved valve for use in connection therewith, the conduit connecting the valve with the radiator being broken away to indicate that the valve may be any desired distance from the radiator. Fig. 2 is an enlarged view of the float for controlling the extremity of the fluid-conduit within the system. Fig. 3 illustrates another construction for controlling the pressure in the pressure-chamber of the valve from the conditions within the radiator or other part of the system with which the valve is connected. Fig. 4 is a view similar to Fig. 1, except that the construction is shown when the radiator or heating system is in use, but with no water of condensation in the system. In this view certain parts of the valve construction are sectionized which are shown in elevation in Fig. 1.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a radiating device, 6 a drainage-pipe, and 7 a valve device interposed between the drainage-pipe and the radiator. The casing 8 of this valve device is connected with the radiator by a conduit 9, which may be of any desired length and may extend either upwardly or downwardly from the radiating device, as may be desired. The casing 8 is provided with a drainage-port 10, which when open forms communication between the chamber 12 of the casing on the inlet side of the valve and the drainage-conduit 6. The inlet-chamber 12 is separated from the pressure-chamber 13 by a piston 14, forming a motor. A hollow stem 15 passes through this motor and also through the drainage-port 10 of the casing. To the extremity of this stem remote from the motor is attached a valve-piece 16, adapted to close the port 10 when the valve-piece is properly actuated by the motor. Located within the pressure-chamber and bearing against the motor-piston is a coil-spring 17, whose force is sufficient to actuate the piston when the pressure is equalized in the chambers 12 and 13. The tension of this spring, however, is such that when the pressure from the system is cut off from the chamber 13 the said pressure acting on the motor from the inlet side of the valve will actuate the motor against the tension of the spring and close the port 10 by the movement of the valve-piece 16 thereinto. As shown in the drawings, a passage 18 is formed in one side of the valve-casing, extending into the wall of the conduit 9 and communicating with the interior of the radiating device by a small conduit 19, whose inner extremity is normally closed by a float 20. This passage 18 communicates at its extremity remote from the tube 19 with the pressure-chamber 13.

The operation of the device may be explained as follows: I will first assume that the outlet-port 10 of the valve is closed by the valve-piece 16 and also that the inner extremity, or the extremity within the radiator of the pressure-pipe 19, is closed by the float 20. In this case the pressure within the chamber 13 is the same as in the drainage-conduit 6, and consequently less than that on the inlet side of the motor or within the chamber 12 of the casing. Hence when these conditions exist the valve-piece must remain in the closed position, or the position closing the outlet-port 10. Now, assuming that the water of condensation designated by the letter A in Fig. 1 accumulates within the lower part of the radiator, it will act on the float 20 and open the extremity of the pressure-tube 19 within the radiator, whereby the pressure within the radiator is communicated to the chamber 13, thus equalizing the pressure in the chambers 12 and 13. In this event the spring 17 acting on the motor-piston actuates the latter and opens the drainage-port 10 by moving the valve-piece 16 to the position shown in Fig. 1. Then the water of condensation will escape from the radiator until the float 20 is allowed to resume its normal position, closing the radiator extremity of the pressure-tube 19.

In the construction shown in Fig. 3 the pressure-tube 19 is closed at its inner extremity by a plug 19^a, and an orifice 19^c is formed therein. This orifice is adapted to be closed by a device 21, which is composed of such material that its expansion and contraction due to the changes of temperature within the radiator are sufficient to cause the orifice 19^c to remain open as the water of condensation accumulates in the radiating device and partly submerges the device 21, while in the absence of this water the radiating device is much hotter and the expansion of the pin 21 will be sufficient to close the orifice 19^c and cut off the pressure within the system from the pressure-chamber 13 of the valve. The pin 20 is supported by a U-shaped bracket 21, connected with the tube 19, the latter being suitably supported within the radiating device or system.

In order to prevent the valve-piece 16 and its connections from moving too far when moved to the open position, as shown in Fig. 1, the hollow stem 15 is provided with a claw 23, which engages the bottom of the valve-casing around the port 10 and limits the opening movement of the valve-piece and motor.

Attention is called to the fact that by virtue of my improvement the discharge of water from the system may be controlled by the conditions within any part of the system outside of or beyond the valve in the direction

of the radiating device or heating portion of the system as distinguished from the return or discharge portion thereof.

Having thus described my invention, what I claim is—

1. In a heating system, the combination of a radiating device, a discharge-pipe, a valve device interposed between the outlet of the radiating device and discharge-pipe, a pressure-motor for operating the valve-piece of said valve device, the motor having its opposite sides acted upon respectively, by the pressures within the valve device on the outlet side of the radiator, and discharge-pipe, and means located in the radiating device outside of or beyond the inlet side of the valve device, and controlled by conditions at the point of location, to automatically control the pressure on the outer side only of the said motor.

2. In a fluid system, the combination of a discharge-pipe connected with the system, a valve device for controlling the fluid-discharge through the pipe, a pressure-motor for operating the valve-piece of said valve device, said motor having its opposite sides acted on respectively by the pressures within the valve device on the outlet side of the system, and the discharge-pipe, and means located within the system outside of or beyond the inlet side of the valve device and controlled by conditions at the place of location, whereby the pressure on the outer side only of the motor is regulated or controlled.

3. In a heating system, the combination of a heater or radiator, a discharge-pipe, a valve device in said discharge-pipe having a suitable valve-casing provided with a port for the discharge of the water, a fluid-pressure motor controlling said port, the valve-casing being provided with a fluid-pressure chamber on the outside of said motor, a passage connecting the said fluid-pressure chamber only with a portion of the pressure system beyond the valve-casing, and means located within the last-named portion of the system for controlling said passage, said means being adapted to be controlled by the collection of water of condensation within the system outside of or beyond the valve device.

4. In a steam-heating apparatus, the combination of a radiating device, a return for the air and water of condensation leading therefrom, a valve device interposed between the outlet of the radiating device and the return, a pressure-motor for operating the valve-piece of said valve device and having its opposite sides acted upon respectively, by the pressures in the radiator-outlet and the return, and means automatically controlled by the conditions within the radiating device outside of or beyond the valve device, to control the differential pressure acting on the outer side only of the motor.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK C. GOFF.

Witnesses:

DENA NELSON,

BURT L. RHOADS.