

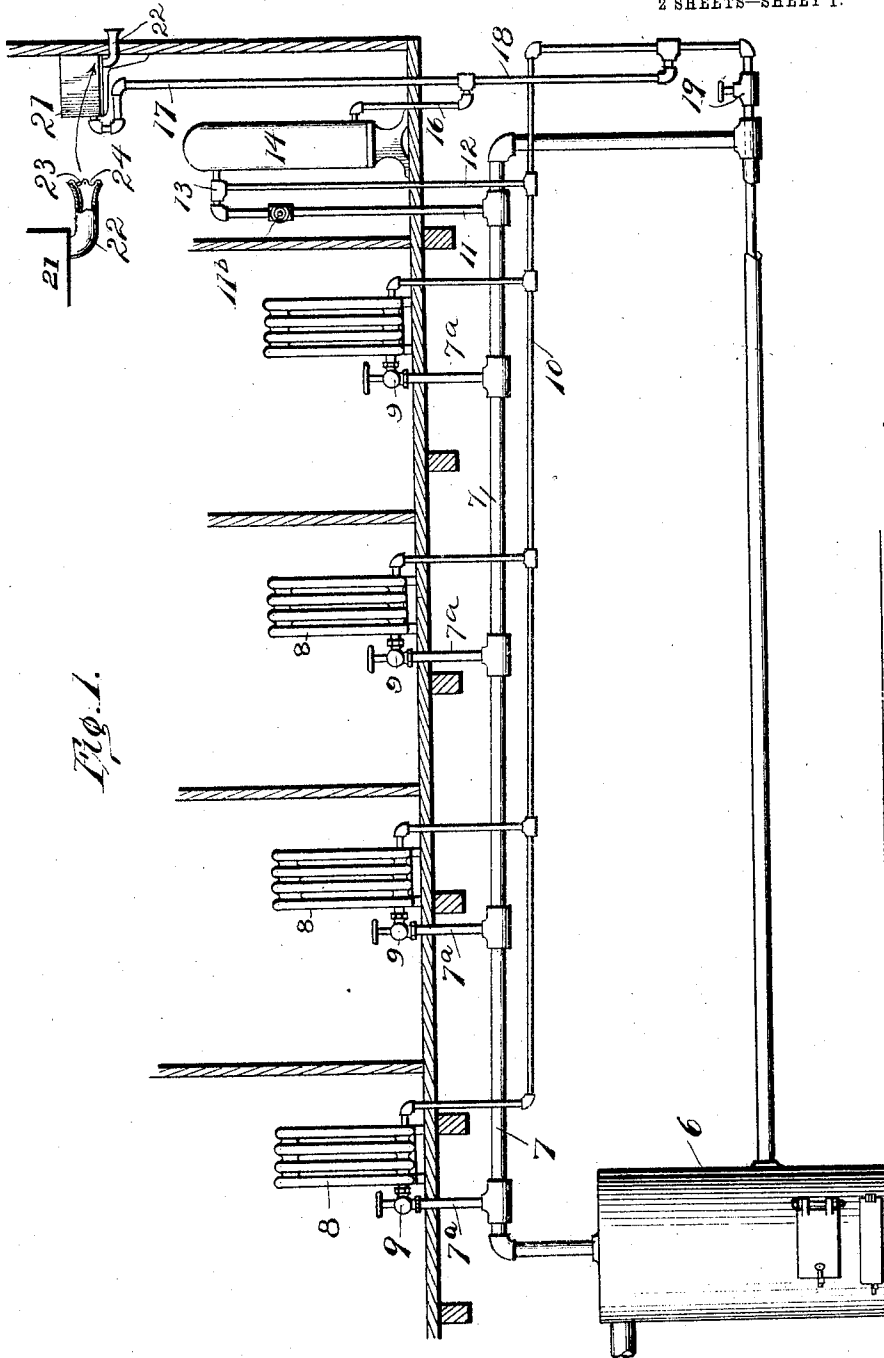
No. 820,320.

PATENTED MAY 8, 1906.

F. SHURTLEFF.
HEATING SYSTEM.

APPLICATION FILED MAY 1, 1965.

2 SHEETS—SHEET 1.



WITNESSES:

W. R. Taylor.

Jos. A. Ryan

INVENTOR

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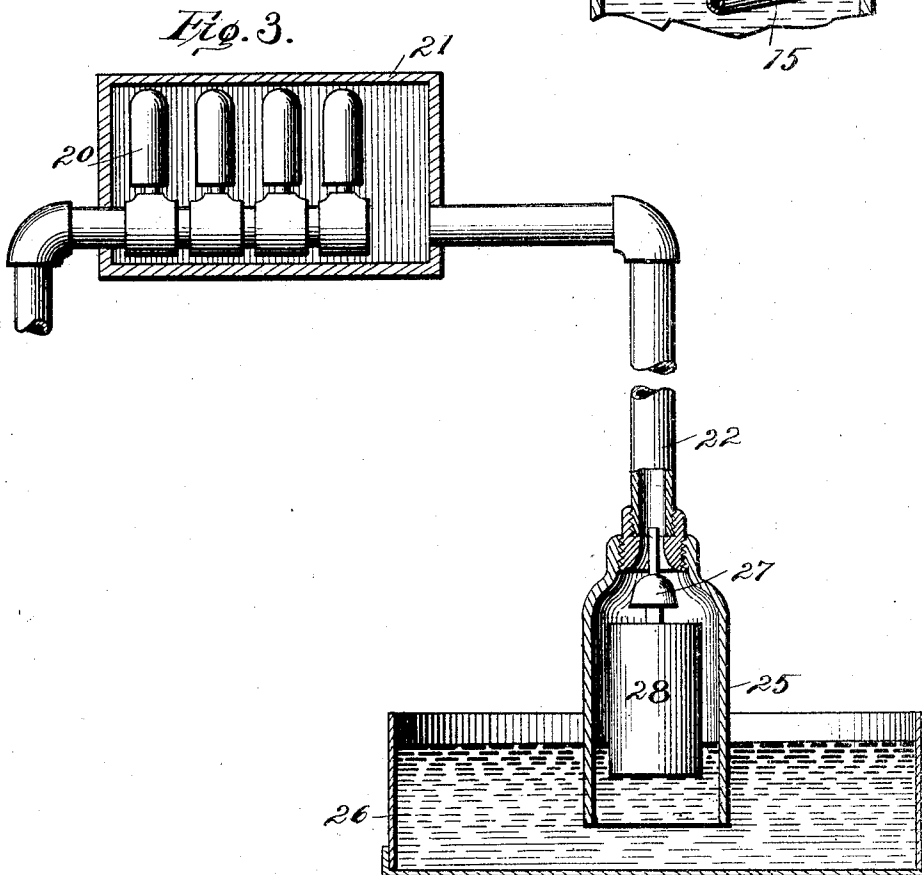
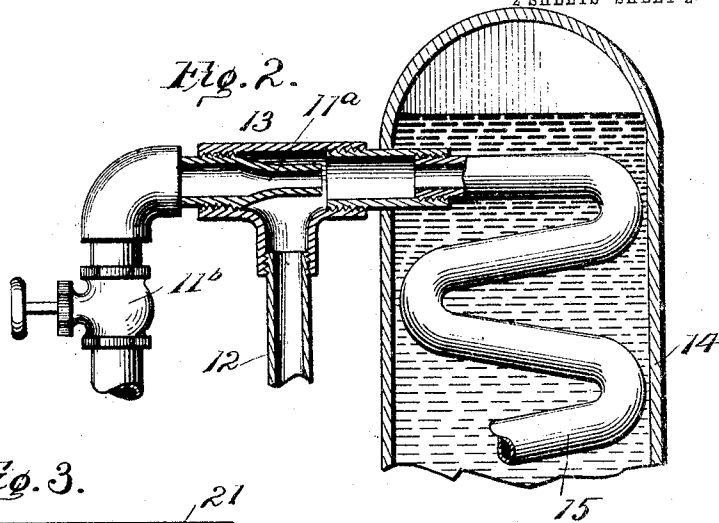
ATTORNEYS

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2 SHEETS—SHEET 2



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UNITED STATES PATENT OFFICE.

FRANK SHURTLEFF, OF MOLINE, ILLINOIS, ASSIGNOR OF ONE-HALF TO
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HEATING SYSTEM.

No. 820,320.

Specification of Letters Patent.

Patented May 8, 1906.

Application filed May 1, 1905. Serial No. 258,251.

To all whom it may concern:

Be it known that I, FRANK SHURTLEFF, a citizen of the United States, residing at Moline, in the county of Rock Island and State of Illinois, have made certain new and useful Improvements in Heating Systems, of which the following is a specification.

This invention relates to steam-heating systems, and particularly to that class thereof known as "vacuum" systems wherein a low or less than atmospheric pressure is utilized or permitted and in which it is necessary to first empty the radiators and connections of air and thereafter prevent the reëntry of air thereinto and maintain at least a partial vacuum in the system.

Various means have been devised for venting the air from the radiators, including automatic or thermostatic valves located at the radiators, vacuum-pumps, and others subject to the defects of slow circulation, pounding, back pressure, discharge of foul air and water into the rooms, increased cost of installation and attendance, and the like.

The object of my invention is to provide an apparatus free from such defects and characterized by improved means for venting the air from the radiators by ejecting devices all located at one point and discharging such air outside the building or rooms and for sealing the system against return of the air. This object is effected by the apparatus hereinafter described, and shown in the accompanying drawings, in which—

Figure 1 is a sectional elevation of the system. Fig. 2 is an enlarged detail in section of the ejector. Fig. 3 is an enlarged sectional detail of a sealing device for maintaining the vacuum.

Referring specifically to the drawings, 6 indicates a boiler or steam-generator of any suitable construction, and 7 the steam-pipe, having suitable branches 7^a leading to the radiators 8, respectively. Valves are provided at 9, controlling the inlet to the respective radiators. The return-pipe is indicated at 10, leading from suitable branches connected to the radiators back to the water-space of the generator.

Beyond the radiators the supply and return pipes have, respectively, branches 11 and 12 leading to an ejector or inspirator 13, and the pipe 11 discharges a jet of steam through a nozzle 11^a in the ejector, which is

connected to a condenser comprising a tank 14 and a coil 15 therein. The steam-pipe 11 of the ejector has a hand-valve 11^b to regulate the suction and limit, if necessary, the heat in the condenser. The tank is supplied with cold water through suitable house or service connections, and the coil receives mixed air and steam from the ejector. The pipe 11 is connected to the return-pipe above the water-level in the boiler. The coil is connected at its lower end to a pipe 16, which branches into a rising air-pipe 17 and a descending water-pipe 18, which latter joins the return-pipe 10, which extends thence to the water-space of the boiler, preferably through or within the return side of the steam-pipe 7, so that the return-water is heated to substantially even temperature with the water in the boiler before entering the same. A check-valve is placed at 19 to prevent backflow. The pipe 17 leads to a series of automatic air-vents 20 of known construction in a casing 21, a plurality of vents being employed, so that operation is assured even should one stick or otherwise fail to work. The casing 21 is air-tight except a vent 22, leading through the wall of the building to the outside and discharging, preferably, through a rose-head 23, having a netting 24 to keep out insects.

With the attachment shown in Fig. 3 the vent 22 instead of opening directly to the atmosphere extends to a bell 25, the rim of which dips below water in a tank 26, located by preference in the basement. At the top of the bell is a valve 27, controlled by a float 28 in the bell to open or close the vent 22 and providing a water seal therefor, but allowing escape of the air through the water when the valve is open. As shown, the ejector is in communication with all the radiators, and in operation the steam-jet flowing from the nozzle 11^a sucks the air out of the radiators and the return-pipe and forces the moist air into the condenser-coil, where the steam and vapor condenses. A suction or vacuum is also thus produced, which causes quick action or supply of steam to the radiators. The water of condensation from the steam and vapor returns to the boiler through the pipe 18. The air goes up the pipe 17 and through the automatic vents 20 into the casing 21, whence it escapes to the outside atmosphere through vent-pipe 22.

With the seal attachment shown in Fig. 3 the vacuum is preserved, because when formed the atmospheric pressure causes the water in tank 26 to rise in bell 25, and the float 28 closes the valve 27, which prevents air returning to the system and maintains the vacuum in the boiler and radiators.

It will be seen that the vents are not on the radiators and ill-smelling air or water is not discharged there. The return connections are wide open at all times, so that slow service and pounding are obviated and a constant circulation assured, providing more heat than usual with the same pressure.

What I claim is—

1. The combination with a steam-heating system having a pipe connected to the bottom of all of the radiators for the return of the water of condensation and the discharge of air therefrom, of an air-riser pipe connected to said pipe for separating the air from the water therein, a condenser through which said air-pipe extends, an air-vent connected to said air-pipe beyond the condenser, and a water-return pipe also connected to said air-pipe beyond the condenser and leading back to the boiler.

2. The combination with a steam-heating system having a common return-pipe connected to the radiators, of an air-venting pipe connected to said return-pipe beyond the radiators, an ejector in said air-pipe to suck air therethrough, and a condenser beyond the ejector through which said vent-pipe extends.

3. The combination with a steam-heating system having a common return-pipe connected to the radiators, of an air-venting pipe

connected to said return-pipe beyond the radiators, an ejector in said air-vent pipe operated by steam from the boiler of the system, a condenser through which said vent-pipe extends beyond the ejector, and a water-of-condensation-return pipe connected to said vent-pipe beyond the condenser and leading back to the boiler.

4. The combination with a steam-heating system having a common return-pipe connected to the radiators, of an ejector having its suction-pipe connected to said return-pipe above the water-level in the boiler, said ejector operating by steam from the boiler, a condenser having a pipe into which said ejector discharges leading to an air-vent, and a water-return pipe connecting said condenser-pipe and back to the boiler.

5. The combination with a steam-heating system having a common return-pipe leading from the radiators, of a plurality of air-vents connected to said pipe, and an inclosed casing for the vents, provided with a discharge-pipe.

6. The combination with a vacuum steam-heating system, of a plurality of air-vents common to the radiators thereof, an inclosed casing over said vents having a discharge-pipe with an outlet-valve, and a tank containing liquid in which the end of the pipe is sealed, having a float therein controlling said valve.

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Witnesses:

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