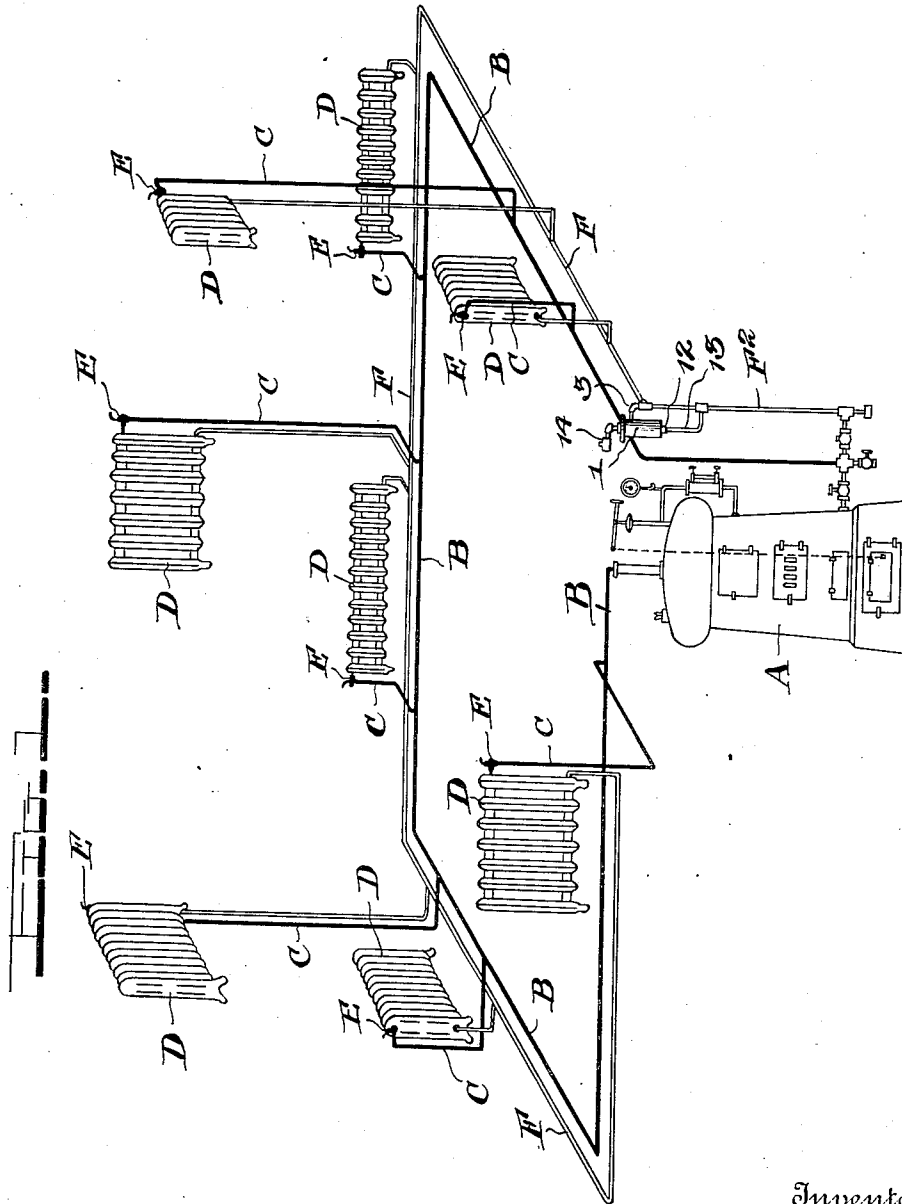


J. A. HOLMBERG.  
STEAM TRAP FOR VAPOR HEATING SYSTEMS.  
APPLICATION FILED APR. 12, 1915.

1,198,918.

Patented Sept. 19, 1916.  
2 SHEETS—SHEET 1.



Witnesses

Chas. L. Griesbauer

Inventor  
John A. Holmberg,

by *H. Wilson & Co.*

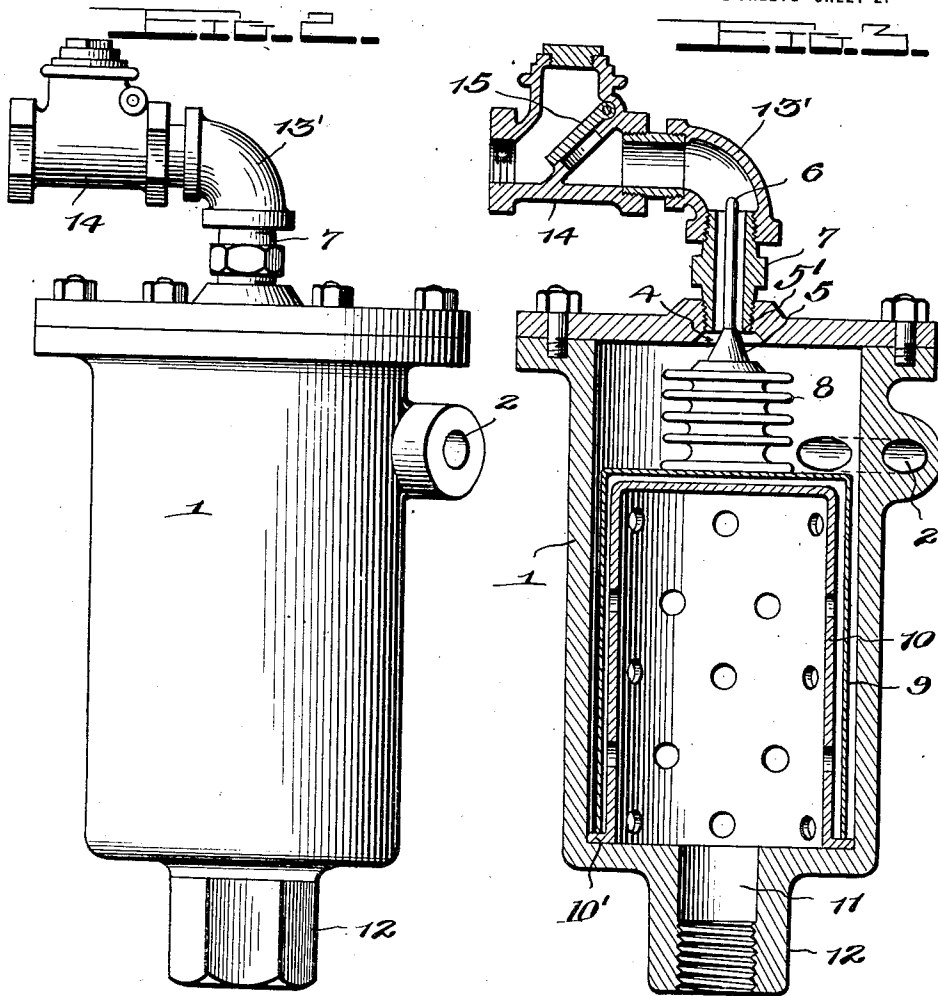
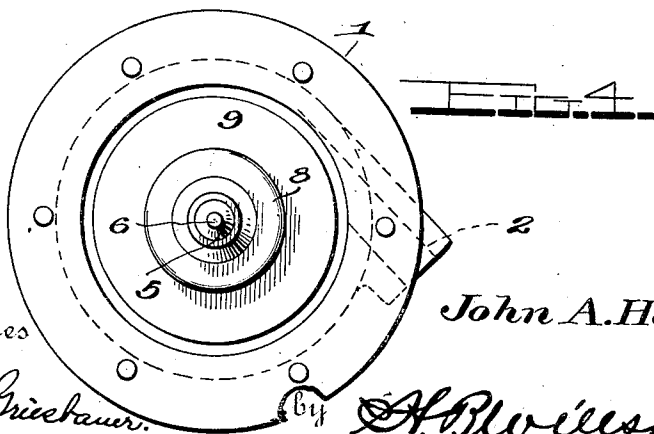
Attorneys

J. A. HOLMBERG.  
STEAM TRAP FOR VAPOR HEATING SYSTEMS.  
APPLICATION FILED APR. 12, 1915.

1,198,918.

Patented Sept. 19, 1916.

2 SHEETS—SHEET 2.



Witnesses

Chas. L. Grubauer.

Inventor  
John A. Holmberg,

By *H. B. Wilson & Co.*

Attorneys

# UNITED STATES PATENT OFFICE.

JOHN A. HOLMBERG, OF LINDSBORG, KANSAS.

STEAM-TRAP FOR VAPOR-HEATING SYSTEMS.

1,198,918.

Specification of Letters Patent.

Patented Sept. 19, 1916.

Application filed April 12, 1915. Serial No. 20,940.

*To all whom it may concern:*

Be it known that I, JOHN A. HOLMBERG, a citizen of the United States, residing at Lindsborg, in the county of McPherson and State of Kansas, have invented certain new and useful Improvements in Steam-Traps for Vapor-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.

This invention relates to steam heating systems and more particularly to that class known as vacuum systems wherein a low or less than atmospheric pressure is utilized and in which it is necessary to first empty the radiators and connections of air and thereafter prevent the reentry 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 this invention is to provide an apparatus free from such defects and characterized by the improved means for venting the air from the radiators by a trapping and ejecting device located at one point and discharging such air outside the building or rooms and for sealing the system against the return of air.

Another object is to so construct a trapping and air ejecting device of this character in which water entering with the air or steam is quickly and thoroughly separated therefrom, permitting the air to rise and pass out in one direction and the water to flow down and be retained in the trap until a predetermined quantity thereof accumulates.

Another object is to so construct a trap of this character that the water and steam entering it will be deflected and brought into whirling contact with the walls thereof so that said walls will be thoroughly cleansed thereby and accumulation of grease and the like on said walls prevented.

With this and other objects in view, the invention consists of certain novel features of construction, and the combination and ar-

rangement of parts as will be more fully described and claimed.

In the accompanying drawings: Figure 1 represents a diagrammatic view of a steam heating system equipped with this improvement; Fig. 2 is an enlarged detail side elevation of the steam trap constituting this invention; Fig. 3 is a central vertical section thereof, and Fig. 4 is a plan view thereof.

In the embodiment illustrated, a boiler or steam generator A of any suitable construction is shown having a steam pipe B provided with suitable branches C leading to the radiators D respectively. Valves are provided at E for controlling the inlet to the respective radiators.

A return pipe indicated at F is connected with suitable branches F' leading from the radiators R and with the water space of the generator, said pipe being here shown provided with a vertically disposed portion F<sup>2</sup> which connects the main portion thereof with the boiler.

In the preferred embodiment of this invention a combined steam trap and air vent 1 is located near the end of the return line F at a point above the plane where said line drops below the water level in the boiler (see Fig. 1) and is disposed adjacent the junction of the horizontal main line F and the vertical portion F<sup>2</sup>. This improved trap 1 comprises a body which may be of any usual form being here shown in the form of a cylinder having a removable closure at its upper end provided with an opening 4 and with an inlet 2 extending tangentially through one side wall thereof near its upper end. This opening 2 is connected by a pipe 3 with the main or return line F the connection of said pipe with the trap being in a plane above its connection with said return line. By so connecting this pipe 3 with the trap and the return line the air and water forced through the return line F by the pressure exerted by the incoming steam is caused to separate at this point, the air rising through pipe 3 and entering trap 1 while the water flows by gravity down through the vertically disposed portion F<sup>2</sup> of the return pipe back to the water space of the boiler. The object in disposing this inlet 2 tangentially of the casing is to cause the entering fluid to impinge against the side wall of the trap and thereby thoroughly separate the air and

water contained therein. The air so freed will escape through the air discharge opening 4 and the water fall to the bottom of the casing.

5 The opening 4 in the top of the casing is controlled by a cone-shaped valve 5 having a stem 6 disposed in a pipe 7 leading from said opening 4 and by means of which said valve is guided in its opening and closing  
10 movements. This pipe 7 has a sharp lower edge 5' against which the valve 5 seats and thereby presents no projections for the accumulation or lodgment of dirt. The valve 5 is mounted on a thermostat 8 shown in the  
15 form of a bellows secured to a float 9 which may be composed of any suitable material and is constructed in the form of an inverted cup-shaped member the lower end of which rests on the bottom of the trap. A perforated inverted cup-shaped support 10 is  
20 preferably disposed within the cup-shaped float 9 and is designed to prevent collapsing of the float by the pressure of the thermostat should the material from which the float is constructed be sufficiently light or flimsy as  
25 to render such collapse possible on the expansion of the thermostat, it being sometimes desirable to form the float of such material in order that it may be readily responsive to the accumulation of water within the  
30 trap. This support 10 is provided at its lower edge with a laterally extending flange 10' which rests on the bottom of the casing 1 and with the upper face of which the lower edge of the float 9 is normally engaged as shown in Fig. 3. This flange 10'  
35 serves to space the support 10 a predetermined distance from the side walls of the casing and with which the free edge of said flange engages whereby the support is held against lateral movement. This trap 1 is provided in its lower end or bottom with a discharge opening 11 provided with an internally threaded nipple 12 preferably made  
40 integral therewith and which is designed to connect the trap with an outlet pipe 13 which communicates with the vertical portion F<sup>2</sup> of the return pipe F and is designed for conducting back to the generator water  
45 which accumulates in the trap and is produced by condensation or carried thereinto by the force of the entering air or steam.

55 The float 9 normally rests on the bottom of the casing or on the flange 10' of the support 10 when such a support is used and thus normally closes the outlet 11 against the passage of both air and water and thereby prevents the air from returning to the system and interfering with the circulation  
60 of the steam. The accumulated water forms a seal for the float and is retained in the casing until a sufficient quantity collects to raise the float and uncover the outlet 11.

65 A pipe 13' is shown connected with the pipe 7 and is preferably in the form of an

elbow having a valve casing 14 connected therewith and provided with a check valve 15 for preventing air from entering the trap when the pressure in the boiler falls below atmospheric pressure.

70 In the operation of a low pressure or vapor heating system equipped with this invention when steam is generated in the boiler A it is immediately distributed through the system by passing through  
75 pipes B and C into the radiators D and forces out therefrom air and the water of condensation which is contained in said radiators as a result of the lowering of the pressure in the system and the cooling off of  
80 the radiators. The entrance of the steam into the radiators forces this air and water through the branch pipes F' into the main portion of the return line F and it is driven through said main line back toward the  
85 water space of the boiler. On nearing the end of the line F the air and water encounter the inlet pipe 3 of the trap 1 arranged in the system adjacent the junction of the horizontal main line F and its vertical  
90 terminal F<sup>2</sup>. When the air and water reach this point the water flows by gravity down through the pipe F<sup>2</sup> while the moist air and possibly a small amount of water carried thereby rise through the pipe  
95 3 and enter the trap casing 1 at a tangent through the opening 2. This air forced into the casing through the tangentially disposed opening 2 impinges violently against the opposed wall of the casing and is whirled around therein whereby the moisture contained in the air is separated therefrom and trickles down the side  
100 walls of said casing and accumulates at the bottom thereof between the outer face of the float 9 and the inner face of said casing. The air freed from the water by this contact with the casing wall rises in the casing and passes out of the opening 4 to the atmosphere, the valve 5 being normally open  
110 as shown in Fig. 3. When a predetermined quantity of water accumulates in the trap, which is controlled by the weight of the float and the space between it and the walls of the casing in which the water accumulates, the float 9 will rise carrying with it the thermostat 8 and valve 5 and thus seat  
115 said valve against the sharp edge 5' of the pipe 7 and prevent the water from being ejected through the pipe 13' and permit it to pass out through the perforations in the support 10, through the opening 11 and pipe 13 into the return pipe F<sup>2</sup> through which it  
120 will be conducted back to the water space of the generator. After the air in the main line F has been discharged through the valve controlled opening 4, steam enters said trap 1 through the opening 2 at a point directly opposite the thermostat and the heat thereof will immediately cause the thermo-  
130

stat 8 to expand and thereby close the valve 5 and firmly seat the float against the flange 10' of the support 10 thus preventing the escape of the steam from the trap and causing it to pass back through the main pipe F into the system.

I claim as my invention:

1. In a combined air ejector and steam trap for vapor heating systems, a casing having an air discharge opening, a water outlet and a fluid inlet, a float normally closing said water outlet, a normally open valve for said air discharge carried by said float, and a thermostat arranged between said valve and float operable by the entrance of steam into said casing for closing the valve and firmly seating the float to maintain it in position for closing said outlet.

2. In a combined air ejector and steam trap for vapor heating systems, a casing having an air discharge opening, a water outlet, a float normally closing said water outlet, a normally open valve for said air discharge carried by said float, and a thermostat arranged between said valve and float, said casing having a fluid inlet opening tangentially through one side wall opposite said thermostat whereby the steam entering through said inlet will immediately impinge on said thermostat and close said air discharge valve.

3. In a device of the class described, a cylindrical casing having closures at its ends provided with centrally disposed apertures constituting an air discharge and a water outlet respectively, an inverted cup-

shaped float disposed in said casing and surrounding said outlet, a thermostat carried by the closed end of said float on its outer face, a normally open valve for closing said air discharge carried by said thermostat, and a guide stem on said valve extending through said air discharge, said casing having a tangentially disposed inlet opening in its side wall at a point above said float opposite said thermostat.

4. In a device of the class described, a cylindrical casing having closures at its ends provided with centrally disposed apertures constituting an air discharge and water outlet respectively, an inverted cup-shaped float disposed in said casing, a combined guide and perforated support for said float disposed within the float and corresponding in shape thereto and of slightly smaller size, said support having an outwardly extending annular flange on its open end resting on the end of said casing outside the water outlet, the edge of said flange engaging the side walls of the casing, said flange forming means for spacing said support from said side walls and for holding it against lateral movement, the edge of the open end of said float resting normally on the flange of said support.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

JOHN A. HOLMBERG.

Witnesses:

G. N. MALEN,  
JNO. T. S. REED.