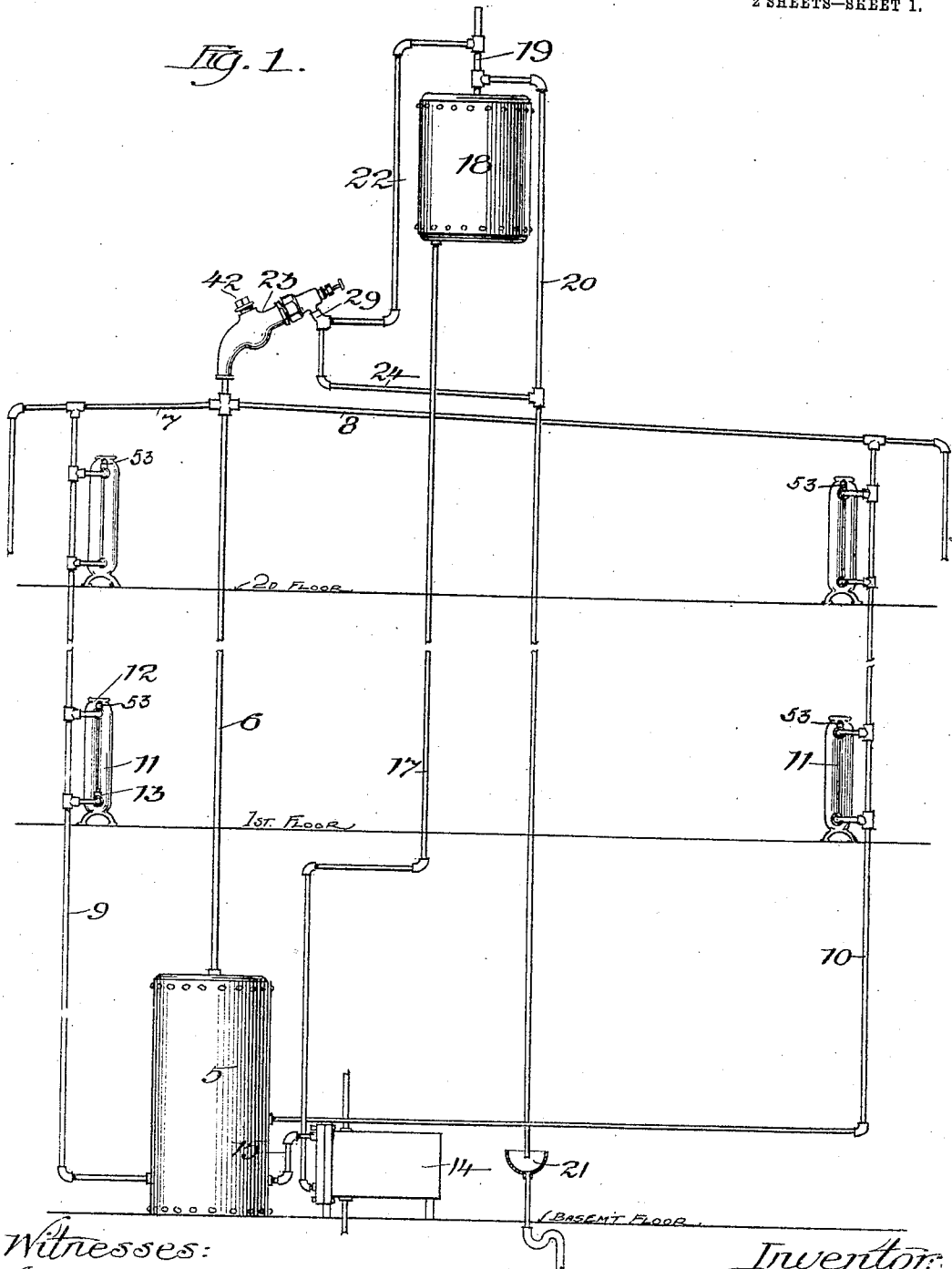


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HEATING SYSTEM.
APPLICATION FILED JUNE 29, 1908.

932,349.

Patented Aug. 24, 1909.
2 SHEETS—SHEET 1.



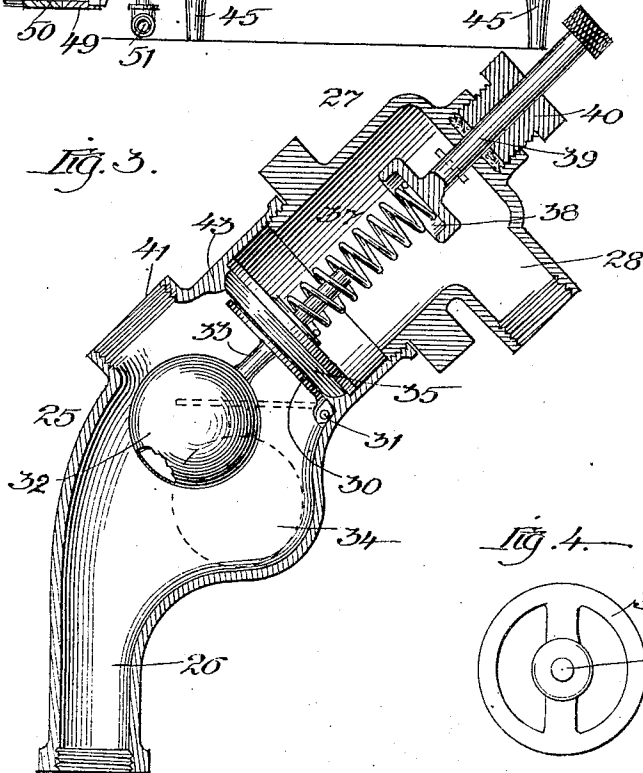
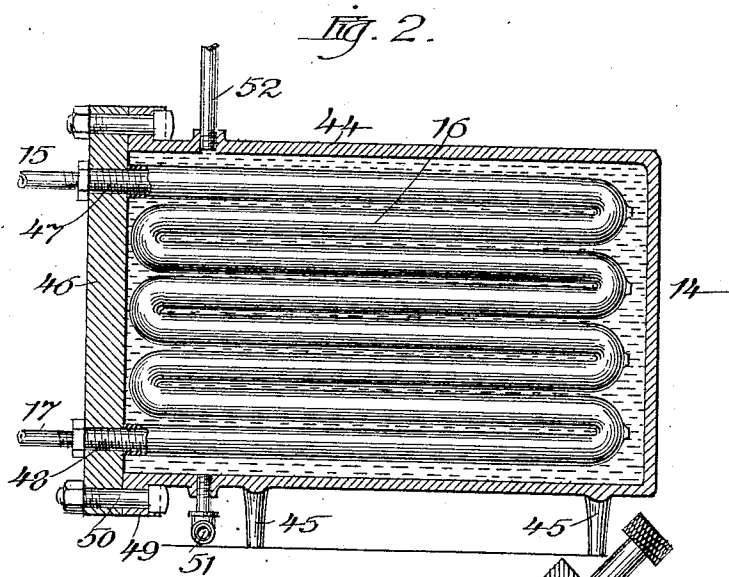
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UNITED STATES PATENT OFFICE.

DAVID M. STOTT, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO HORACE E. ARGO, OF CHICAGO, ILLINOIS.

HEATING SYSTEM.

932,349.

Specification of Letters Patent.

Patented Aug. 24, 1909.

Application filed June 29, 1908. Serial No. 440,861.

To all whom it may concern:

Be it known that I, DAVID M. STOTT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Heating Systems, of which the following is a specification.

This invention relates more particularly to heating systems employing hot water as the heating medium, although the system is adapted for use with steam.

The object of the invention is to simplify the piping arrangements and obviating the necessity for using air valves on each of the radiators as is the present practice, thereby simplifying the system and greatly cheapening the cost of installation.

The system admits of the use of pipes of smaller diameter than those ordinarily employed by reason of the provision made for accelerating the flow of hot water through the pipes; and the employment of small pipes instead of large ones further reduces the cost of installation to a very marked extent.

The system further has for its object to prevent an overflow and waste of water through the expansion tank, thereby resulting in a saving of the water and in the maintenance of heat in the system.

A further object of the invention is to provide for the escape of all air and steam which may accumulate in the pipes, boiler and radiators as the system is being filled, or while the water is being heated, and to afford a relief safety device in case for any reason the pressure becomes too great.

A further object of the invention is to prevent a vacuum while the water is cooling or being drawn off.

Further objects of the invention will appear from the detailed description of the invention which consists in the features of construction and combination of parts herein after described and claimed.

In the drawings Figure 1 is a diagrammatic view of a heating system installed in a building; Fig. 2 a longitudinal sectional view of the cooling device; Fig. 3 a longitudinal sectional view of the valve; and Fig. 4 a detail of the pressure ring in the valve.

Referring to Fig. 1, 5 represents a boiler preferably installed in the basement of the building to be heated, which boiler has leading, from the top thereof, a supply pipe 6

connecting with header pipes 7 and 8, which header pipes are connected with the lower portion of the boiler through the medium of return pipes 9 and 10 respectively. The return pipes serve to supply the radiators 11 which are connected with return pipes by means of short supply and discharge pipes 12 and 13 respectively.

Located adjacent to the boiler and at the lowest point in the system is a cooling device 14 which forms the subject matter of a pending application Serial No. 431,222, filed May 6, 1908, which will be described more in detail hereafter. The cooling device is connected with the lower portion of the boiler by means of a pipe 15 which enters the cooling device near the upper portion thereof, and connects with a coil of pipe 16 within the cooling device, which coil of pipe, at its lower extremity, has leading therefrom a riser 17, which connects with the bottom of the expansion tank 18 located above the level of the header pipes 7 and 8. The expansion tank has leading from the top thereof a discharge pipe 19 adapted to discharge steam and air to the atmosphere, which discharge pipe, near its lower end, connects with a waste pipe 20, discharging into a funnel 21 leading to a sewer or other point of discharge. The discharge pipe, above the connection with the waste pipe has entered thereinto an air pipe 22 which leads down below the level of the tank and connects with an air valve 23 which is located at the upper end of the supply pipe 6, and immediately above the connection of the two headers 7 and 8 therewith. The valve 23 also has a water discharge pipe 24 leading therefrom and discharging into the waste pipe 20. The construction of the valve is fully described in application Serial No. 430,804, filed May 4, 1908, but briefly is as follows: The valve comprises a casing 25 terminating at its lower end in a gooseneck 26 which is adapted to fit onto the upper end of the supply pipe 6; and the casing, at its upper end, is tapped to receive a hollow cap 27 provided with a discharge port 28, which receives a fitting 29 into which the ends of the pipes 22 and 24 are entered. The upper portion of the valve casing extends obliquely and has located therein a valve 30, which is connected with the casing at its lower edge by means of a hinge 31. The valve gate has secured there-to a float ball 32, which is connected with the

gate by means of a stem 33 and is adapted, when lowered, to rest within a protuberant float chamber 34. Behind the gate, in the position shown in full lines, is an open pressure ring 35, as shown in Fig. 4, which ring is provided in its center with a stud 36, which receives the lower end of a coil spring 37, the upper end of which lies within a cup 38 on the end of a screw stem 39 entered through a gland 40 in the end of the cap 27. The valve casing, adjacent to the float ball, is provided with a hand hole 41 which is adapted to be closed by a screw plug 42, and which permits access to be had to the interior of the valve. The pressure ring 35 seats against an annular flange 43 on the interior of the casing which serves as a seat from which it can be forced back against the tension of the coil spring.

The cooling device 14 is in the form of a box-like casing 44 inclosing the coil 16, which casing rests upon legs 45, and is closed at its forward end by means of a plate 46, through which are tapped sections of pipe 47 and 48, which are screwed into the ends of the coil 16, and which, in turn, receive the ends of the pipes 15 and 17. The plate 46 is secured to a flange 49 on the body of the casing by means of bolts 50. The casing has entered into its bottom a cold water supply pipe 51, and has leading from its top a cold water discharge pipe 52, which, preferably, leads to the water supply system of the house. The details of the cooling device being fully set forth in the applications previously mentioned, further description is deemed unnecessary.

In use, the water will fill the circulatory system until it rises to the lower level of the float within the valve, which thereafter will be lifted until the valve gate closes the apertures of the pressure ring, thereby preventing the escape of water under normal conditions. The air driven out of the system by the rise of water finds its escape through the pipe 22 and the pipe 19 leading to the atmosphere.

In the present invention the piping is arranged to afford a circulating system and an expansion column, each of which is entirely independent of the other save only that both are connected with the boiler. In the circulating system, with which all the radiators are connected, it is desirable to maintain a solid volume of water, unbroken by air bubbles or steam bubbles. This is desirable for the reason that a much greater volume of heat will be carried by a solid stream of flowing water than by a stream which is broken by steam and air bubbles at different places in the piping. The function of the air valve 23, which is located at the highest point in the circulating system, is to eliminate steam and air bubbles which may be generated or admitted into the circulating system, and to maintain a solid stream of water in the piping. The construction and location of the air valve is such that it

will receive and discharge air and steam from the various radiators and pipes comprising the system, which obviates the necessity for employing a separate air valve in connection with each of the radiators. The function of the expansion column is to kill off steam bubbles which may be generated in the boiler and which may seek to escape through the expansion tank, and also to retard the formation of such bubbles by providing a sufficient head of water in the expansion column to increase the pressure on the water in the boiler to such an extent that the water will not be transformed into steam at the normal boiling point. Furthermore, the increased friction due to the presence of the coils in the cooling device aids in retarding the escape of steam bubbles and in condensing such bubbles in case they may be generated in the boiler. If the flow of water to the expansion tank were unimpeded by the cooling action of the cooling device, the expansion column would be composed of heated water interspersed with steam bubbles, so that the weight of water in the expansion column would be at a minimum and a continuous loss of water due to overflow from the tank would result. Furthermore, there would be a tendency of the steam to violently blow the water out of the expansion column so that the loss of water and the consequent waste of heat would be very great. By interposing a cooling device in the expansion column a rise of steam in this column will be prevented and the water chilled, so that the weight of the column of water will be maintained at a maximum, and the escape of water from the circulating system will be retarded, and this retarding of the flow toward the expansion tank, and this increase of the pressure on the water in the boiler will serve to raise the temperature of the boiling point in the circulating system, so that it is possible to maintain a temperature in the said system of 230 degrees Fahrenheit or more. This results in an increase in the speed of travel of the water through the system and a consequent increase of the radiation of heat of a given volume of water. The operation of the system is in accord with the well known principle that an increase above atmospheric pressure serves to raise the boiling point of water above 212 degrees Fahrenheit, and a decrease below atmospheric pressure serves to lower the boiling point below such standard. It is desirable in all cases to maintain the expansion column as cool as possible, so that this column will act as a safety valve and will condense any bubbles of steam which may back out of the boiler.

The system is one which utilizes a relatively small volume of water to its greatest extent by maintaining the water in a solid

unbroken volume. With the present system, a given degree of radiation can be secured with the use of a greatly decreased amount of fuel, and the size of the piping can be greatly reduced as compared with ordinary standards. The drain pipe is open at its lower end and discharges into a funnel which acts as a tell-tale to indicate the escape of water from the air and water valve. In this manner it will be possible to determine whether water is discharged from the circulatory system by reason of excess pressure therein and an opening of the valve, or for any other reason. The location and arrangement of the discharge pipe 19 is such as to prevent the siphoning of water from the tank, and the water discharge pipe 24 is so arranged that water from the circulatory system will be discharged directly into the waste pipe without entering and heating the water in the expansion tank. The rapidity of circulation in the present system is such that one square inch of pipe has been found sufficient to supply 300 feet of radiation, which is a much higher efficiency of piping than is possible in systems of the ordinary character.

What I claim as new and desire to secure by Letters Patent is:

1. In a heating system, the combination of a heater, a circulatory system of pipes connected therewith, a normally open air discharge valve located at the highest point of said circulatory system, said valve adapted to be automatically closed by the initial expansion of the heating medium within the system, whereby air and steam bubbles may be eliminated from the system previous to such initial expansion, an expansion tank above the circulatory system, a waste pipe leading from the tank, a cooling device below the tank, a pipe independent of the circulatory system and leading from the cooling device to the tank, and a pipe independent of the circulatory system and leading from the lower portion of the heater to the cooling device and adapted to convey water thereto from the heater, substantially as described.

2. In a heating system, the combination of a heater, a circulatory system of pipes connected therewith, a normally open air discharge valve located at the highest point of said circulatory system, said valve adapted to be automatically closed by the initial ex-

pansion of the heating medium within the system, whereby air and steam bubbles may be eliminated from the system previous to such initial expansion, an expansion tank above the circulatory system, a waste pipe leading from the tank, a cooling device in the form of a coil of pipe and a casing surrounding the coil, means for passing a cooling medium through the casing, a pipe independent of the circulatory system leading from the lower portion of the heater to the coil of pipe in the cooling device and adapted to convey water thereto from the heater, and a pipe independent of the circulatory system leading from the coil of pipe in the cooling device to the expansion tank, substantially as described.

3. In a heating system, the combination of a heater at the bottom of the system, an expansion tank at the highest point of the system, a pipe connection between the heater and the expansion tank, a cooling device interposed in said pipe connection, a circulatory system independent of said pipe connection and said expansion tank and connecting with the heater, and a normally open air discharge valve located at the highest point of said circulatory system, said valve adapted to be automatically closed by the initial expansion of the heating medium within the system, whereby air and steam bubbles may be eliminated from the system previous to such initial expansion, substantially as described.

4. In a heating system, the combination of a heater at the bottom of the system, an expansion tank at the highest point of the system, a pipe connection between the lower portion of the heater and the expansion tank, a circulatory system independent of said pipe connection and said expansion tank communicating at each end with the heater, and a normally open air discharge valve located at the highest point of said circulatory system, said valve adapted to be automatically closed by the initial expansion of the heating medium within the system, whereby air and steam bubbles may be eliminated from the system previous to such initial expansion, substantially as described.

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