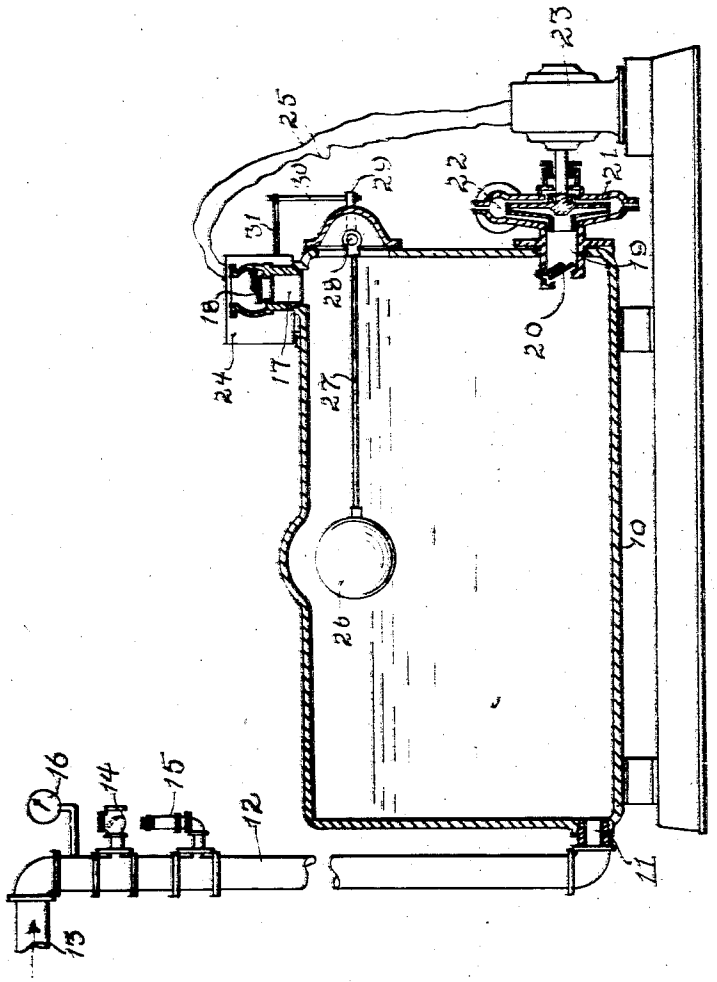
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APPARATUS FOR CREATING A PARTIAL VACUUM ON THE RETURN LINE OF STEAM HEATING SYSTEMS

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APPARATUS FOR CREATING A PARTIAL VACUUM ON THE RETURN LINE OF STEAM-HEATING SYSTEMS.

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This invention relates to improvements in apparatus for creating a partial vacuum on the return line of a steam heating system, and one of the objects of the invention is to maintain a partial vacuum, separate the air from the condensate and return the condensate to the boiler or hot well, allowing the air to escape to the atmosphere.

A further object is to provide an improved apparatus of this character which is particularly adapted, though not necessarily limited in its use, in so called vapor and modulating systems.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts hereinafter more fully described and claimed and shown in the accompanying drawing illustrating this invention, and in which

The figure is a diagrammatic view partly in elevation and partly in section of an apparatus of this character constructed in accordance with the principles of this invention.

In carrying the invention into operation there is provided a tank or receiver 10 which is provided with an inlet 11, preferably adjacent the bottom thereof and to which inlet is connected a pipe 12, which in turn has connection with a header 13, leading from the return line of the system.

Connected with the pipe 12 is a check valve 14, which is adapted to open to permit the escape of air from the pipe 12 and to close to prevent the inlet of outside air into the pipe 12.

A vacuum relief valve 15 of any suitable and well-known construction may be also connected with the pipe 12 and a vacuum gauge 16 may also be provided and connected with the pipe 12.

The receiver 10 is provided with a vent opening 17 controlled by a valve 18, which latter is adapted to open to permit the escape of air from the receiver 10 to the atmosphere and to close to prevent the entrance of the atmospheric air into the receiver.

Leading from the receiver 10, preferably adjacent the bottom thereof, is an outlet 19 controlled by a valve 20. Connected with the outlet 19 is a pump 21, preferably of the centrifugal type, which is adapted to receive liquid from the receiver 10, and the discharge outlet 22 of the pump may be connected with the return to the boiler or hot well.

A motor 23 of any desired or suitable construction is provided and is operatively connected with the pump 21 for actuating the latter. The motor is controlled by means of a suitable switch device 24 which is arranged to control the circuit 25 to the motor.

Within the receiver 10 is a float 26 which is pivotally mounted through the medium of an arm 27 to a fulcrum 28, so that the float will rise and fall in the receiver by the rise and fall of the liquid therein.

The float is connected through the medium of an arm or extension 29 and the connection 30 to the operating member 31 of the switch device 24, whereby upon the rise and fall of the float 26, the switch 24 will be correspondingly operated to control the circuit 25 to start or stop the operation of the motor 23, and consequently of the pump 21.

The operation of the apparatus is as follows. Assuming that the system in connection with which this apparatus is used is cold and the supply lines, radiators and return lines are filled with air and the radiator traps are open.

When vapor is generated in the boiler it rises, forcing the air out of the pipes and the radiators and out of the outwardly opening check valve 14 in the pipe 12. When the steam at a certain temperature, impinges upon the thermostatic traps on the radiators they will close, allowing no steam to pass. When condensate accumulates in the bottom of the radiators, it being cooler than steam, the traps will open allowing the water to flow into the return lines, dropping by gravity through the header 13 and pipe 12 into the tank or receiver 10.

A portion of the steam or vapor contained in the return lines, header 13 and pipe 12 will be condensed forming a partial vacuum therein, which will cause the water which has accumulated in the tank or receiver 10 to be drawn upward into the pipe 12 to a height in feet about equal to the vacuum reg-

istered in the pipe 12 above the water line. If it is desired to maintain, say not more than six inches of vacuum in the return line, the vacuum relief valve 15 is set so that air from the atmosphere will be admitted when the vacuum has reached six inches.

The valves 14 and 15 and the vacuum gauge 16 should be connected at points six feet or more above the top of the receiver 10 when six inches of vacuum is maintained and one foot higher for each additional inch of vacuum.

A column of water will be maintained in the pipe 12 of equal height in feet to inches of vacuum maintained, but any more water which flows from the return line will pass readily into the tank or receiver 10.

As water accumulates in the tank or receiver 10 any air will pass to atmosphere through the vent 17 past the check valve 18.

As the water line in the tank or receiver rises the float 26 rises and when it has reached its highest level the switch 24 will be actuated to connect the electric current through the circuit 25 to the motor 23 to actuate the motor and the pump 21. The discharge from the pump 21 may be connected direct to the boiler.

When the pump is operating the water will be drawn from the receiver or tank 10 through the outlet 19 and returned to the boiler, and as the check valve 18 is then closed a vacuum will be created in the receiver or tank 10, which overcomes the vacuum in the pipe 12 and connections by first emptying the pipe 12 of water and then drawing a volume of air from them equal to cubic volume of the tank or receiver 10, thus maintaining a partial vacuum on the system desired.

When the water in the tank or receiver 10 has been pumped down to a predetermined level, and the float 26 reaches its lowest position, it again operates the switch 24 cutting off the current so that the motor will stop.

The check valve 20 in the outlet 19 prevents any air or water returning to the tank or receiver 10 when the pump is not operating.

As the tank or receiver 10 again fills with water of condensation the cycle of operation is repeated automatically.

While the preferred form of the invention has been herein shown and described it is to be understood that various changes may be made in the details of construction and in the combination and arrangement of the several parts, within the scope of the claims, without departing from the spirit of this invention.

What is claimed as new is:—

1. An apparatus for creating a partial vacuum on a steam heating system embodying means for withdrawing condensates and air from the system, the said means operating to withdraw air substantially equal in volume to the condensates withdrawn, and additional means co-operating with the first said means permitting air to escape to atmosphere.

2. An apparatus for creating a partial vacuum on a steam heating system embodying means for withdrawing condensates and air from the system, the said means operating to withdraw air substantially equal in volume to the condensates withdrawn, additional means co-operating with the first said means permitting air to escape to atmosphere, and means operating automatically to control the operation of the first recited means.

3. An apparatus for creating a partial vacuum on a steam heating system including a receiver having connection with the return line of a steam heating system, a valved vent for the receiver, a valved outlet from the receiver, and a pump connected with the said outlet, the said apparatus operating to create a partial vacuum on the steam heating system.

4. An apparatus for creating a partial vacuum on a steam heating system including a receiver having connection with the return line of a steam heating system, a valved vent for the receiver, a valved outlet from the receiver, a pump connected with the said outlet, the said apparatus operating to create a partial vacuum on the steam heating system, and means included in the said apparatus and operating automatically under predetermined conditions in the apparatus to control the operation of the said pump.

5. An apparatus for creating a partial vacuum on a steam heating system including a receiver having connection with the return line of a steam heating system, a valved vent for the receiver, a valved outlet from the receiver, a pump connected with the said outlet, the said apparatus operating to create a partial vacuum on the steam heating system, and a cut out automatically controlled by the height of liquid in the said receiver for controlling the operation of the said pump.

6. An apparatus for creating a partial vacuum on a steam heating system including a receiver, a pipe connection between the receiver and the return line of the system and extending above the receiver, a vent for the receiver, a liquid outlet from the receiver, a pump connected with said outlet, and means controlled by the height of liquid in the receiver for controlling the operation of the pump, said pump operating to withdraw air and vapor from the said system equal in volume to the condensates withdrawn.

7. An apparatus for creating a partial vacuum on a steam heating system including a receiver, a pipe connection between the receiver and the return line of the system and

extending above the receiver, a vent for the receiver, a liquid outlet from the receiver, a pump connected with said outlet, a cut out controlled by the height of liquid in the receiver for controlling the operation of the pump, said pump operating to withdraw air and vapor from the said system equal in volume to the condensates withdrawn, and means controlled at will for varying the degree of vacuum to be maintained.

In testimony whereof I have signed my name to this specification, on this 31st day of March, A. D. 1925.

BENJAMIN SKIDMORE, JR.