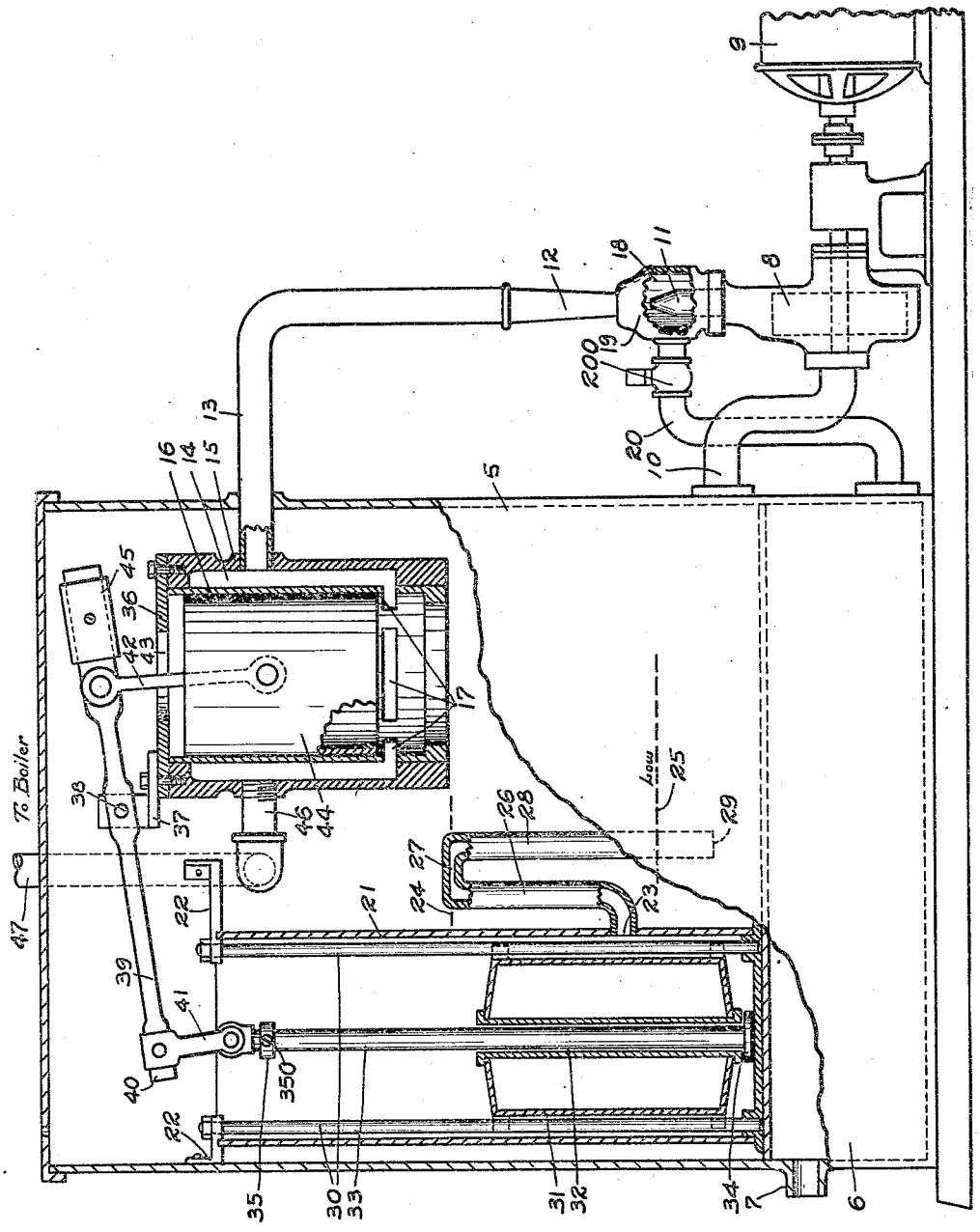
Aug. 18, 1931. V. ROSENHAGEN 1,819,522

VACUUM CONDENSATION CONTROL

Filed April 22, 1927



Patented Aug. 18, 1931

1,819,522

UNITED STATES PATENT OFFICE

VICTOR ROSENHAGEN, OF BELLEVUE, KENTUCKY, ASSIGNOR OF ONE-FOURTH TO WILLIAM C. BUTEN AND ONE-FOURTH TO OTTO WOLFF, BOTH OF NEWPORT, KENTUCKY, AND ONE-FOURTH TO GUSTAVE M. REININGER, OF FORT MITCHELL, KENTUCKY

VACUUM CONDENSATION CONTROL

Application filed April 22, 1927. Serial No. 185,873.

This invention relates to a condensation vacuum and water feed pump apparatus and is particularly for use in steam heating systems of various kinds.

An object of the invention is to provide a device for the purpose stated, which through the agency of a suitably driven centrifugal pump, takes its water from a circulating tank and discharges it into the same tank, said tank serving also to receive condensation from the system which is drawn into the circuit through the agency of said pump.

Another object is to provide a device for the purpose stated which will effectively control the water in the circulating tank so that upon reaching a high water level in the tank, the device automatically conditions itself for discharging water from the tank into a boiler.

Another object is to provide a device of this kind which will continue to feed water to the boiler until the water in the tank reaches a low water level, whereupon the device will again automatically condition itself for discharging into the tank.

Another object is to provide a device of this kind wherein the operation is entirely automatic and wherein sediment and débris picked up in the system can not affect the operation of the device.

These and other objects are attained by the means described herein and disclosed in the accompanying drawing in which the figure represents an elevational view of an installation of the invention, part being broken away, and part being shown in cross section.

The device of the invention is herein disclosed in a simple, practical embodiment, and it will be understood that modifications may be had in order to adapt the invention to various installations suitable for various systems.

A circulating tank 5 of suitable capacity is preferably mounted upon or made integral with a condensation receiver 6 which connects by suitable coupling 7 with the return pipe of a steam heating system (not shown). A centrifugal pump 8 may be driven by any suitable means such as a motor 9 and may also have associated therewith an automatic switch control for the motor which is not shown and which forms no part of this invention. The tank 5 has an outlet 10 near the bottom thereof and said outlet serves to feed the pump 8 from the tank. The water from tank 5 is pumped through nozzle 11 into tube 12 through which it is forced upwardly through a pipe 13 into the interior of the chamber 14 in valve 15. The body 15 has a cored-out portion forming the chamber 14 and is conveniently formed by providing a cylinder 16 interiorly of the tubular valve 15 thereby forming a closure for the chamber 14. Cylinder 16 has near its base a plurality of large ports 17 into which water from the pipe 13 and chamber 14 may flow into the circulating tank 5. The water being forced through nozzle 11 tends to create a vacuum in chamber 18 of the enlarged housing 19 in which the nozzle 11 is located. A pipe connection 20 having check valve 200 effects communication between the bottom of condensation receiver 6 and the chamber 18 so that the products of condensation entering said receiver from the system are immediately drawn up through pipe 20 and are carried along with the circulating stream through the valve chamber and into the circulating tank. Within the tank 5 is mounted an open topped float casing 21 which may be rigidly mounted by means of brackets 22, said casing having a port 23 disposed in the side wall thereof intermediate high water level line 24 and low water level line 25. A siphon tube indicated generally as 26 is connected to port 23 and then extends vertically upward to the high water level 24 where the tube 26 is flattened and spread to provide a wide, flat, shallow passage 27. The depending portion 28 of siphon tube 26 has its free open end 29 disposed at an appreciable distance below the desired water level 25.

Within the float casing 21 are fixed guide rods 30 upon which the float 31 is freely slidable. The float 31 has a center tubular bore or way 32 through which extends a rod 33 having a fixed collar or flange 34 at the lower end thereof and an adjustable collar 35 which may be positioned at various places upon rod 33 above the top of float 31. From the fore-

going it will be apparent that water entering the circulating tank through pipe 13, and valve body 15, will gradually rise in said tank about the casing 21 and will also rise in pipe 28, so that upon attaining the high water level 24 it will overflow through the broad, shallow and restricted passage 27, thereby creating siphonic action so as to rapidly exhaust the water from tank 5 into the body of casing 21. As the water rises in casing 21 the float 31 rises independently of rod 33 until said float strikes the bottom face of collar 35. As water continues to enter casing 21 the float will then raise rod 33 and effect closing of the valve ports 17 through which water enters the tank 5. The control and actuating mechanism will now be described.

The valve body 15 which is rigidly supported within the tank 5 has a perforate top plate 36 to which is secured a bracket 37 which provides a pivotal mounting upon pin 38 for a rocker arm 39. At one end 40 of the rocker arm 39 is a pivoted link connection 41 through which movement may be imparted from rod 33 to the rocker arm. The rocker arm 39 has a piston rod 42 pivotally connected thereto on the opposite side of pivotal mounting 38 and this piston rod depends through opening 43 in cover 36 into the hollow interior of cylinder 16 which forms the inner wall of the valve body. A sleeve valve 44 is supported from piston rod 42 and is adapted for slidable movement within the cylinder 16 for effecting opening and closing of the ports 17 which control discharge from the valve chamber 14 into the tank 5.

When the rod 33 is raised under the influence of float 31, the rocker arm 39 is moved upward at the end 40 while the opposite end is lowered, thereby causing piston rod 42 to lower the valve sleeve 44 which effects closing of ports 17. A suitable adjustable counter weight 45 is provided adjacent the connection of arm 39 with piston rod 42 so that a nice balance may be attained by the weight of valve sleeve 44 and its associated parts on the one hand and the float 31 on the other hand.

As soon as the valve sleeve 44 is sufficiently lowered to substantially close ports 17, the water which continues to flow into valve chamber 14 from pipe 13 is forced through pipe 46 which communicates with chamber 14 and from thence through a suitable connecting pipe 47 which serves as a feed pipe for the boiler (not shown).

When the ports 17 are closed, the continued operation of pump 8 draws water from the bottom of tank 5 and forces it through pipes 12 and 13, chamber 14, and pipes 46 and 47, without allowing any appreciable amount to return to the tank, thus reducing the volume of water in the tank 5 and finally exhausting the supply to a point below low water level 25. As the water recedes in the circulating tank, the water also recedes in the float casing by way of siphon pipe. The receding water allows float 31 to move downwardly on rod 33 which remains stationary, and thus causes the valve 44 to remain closed until the float strikes the bottom flange or collar 34 on the rod. When the float reaches the bottom of rod 33, the continued outflow of water from casing 21 removes the buoyant force from the float and permits it to overbalance the valve sleeve 44 and its associated parts, so that feed valve is raised and the continuously circulating water again flows out of ports 17 into the tank and ceases to flow to the boiler through pipes 46 and 47.

Cylinder 16 and valve sleeve 44 are preferably formed of non-corrodible materials so that they may slide freely with a minimum of friction and for that reason responsive to the influence of rising and lowering water in the circulating tank 5. It will also be understood that the valve may be caused to operate oftener. The collar 35 may be adjusted closer to the top of float 31 and secured in such position by any suitable means such as set screws 350. It will be apparent that with collar 35 at a lesser distance from the bottom of rod 33, the float 31 will strike said collar when a relatively lesser quantity of water has entered casing 21, thereby shutting off valve 44 and discharging oftener to the boiler. It will be understood, of course, that the products of condensation are being continually drawn from the system and receiver 6 and are being added to the volume of water in the circulating tank 5.

Sediment and débris find no place to lodge within the valve chamber 14 because they are flushed out into the circulating tank through the large ports 17. The sediment can not find its way into float casing 21 because the siphonic action is not great enough to draw heavy particles through pipe 26 and also because of the free substantially frictionless mounting of float 31 upon its guide rods 30 and rod 33. The device is so arranged that it is incapable if improper adjustment, because, regardless of the adjustment of counter weight 45 or collar 35, the siphonic action will take place in opposite directions and will regularly open and close ports 17 and thus eliminate all possibility of overflow of the tank 5. The device may therefore be said to be "fool proof" and is ready for operation at any time without a reconditioning. The simplicity of the device permits of sturdy parts which are not liable to get out of order and which are nevertheless subject to a nicety of balance which insures continuous automatic operation.

What is claimed is:

1. In a device of the class described the combination of a tank adapted to contain

liquid, a float casing in the tank, a float in said casing, a siphon tube connected at its one end with the casing and at its opposite end with the interior of the tank below a normal low liquid level, the top portion of the siphon tube being co-incident with the high liquid level, a liquid supply connection, a two-way valve in said connection and means comprising a pivotally mounted arm for actuating the valve and arranged to be actuated by the float in the casing after predetermined movement of said float.

2. In a device of the class described the combination with a tank of a tubular valve body having an annular chamber therein, ports in the interior cylindrical wall of said body, a sleeve valve reciprocal upon said cylindrical inner wall of the body for controlling the ports therein, a pivotally mounted arm, means connecting the sleeve valve and said arm, a float casing beneath an end of said arm and disposed in the tank, a siphonic connection between the tank and casing, a rod pivotally suspended from the arm into the casing, a float in the casing adapted for independent reciprocation on the depending rod and collars adapted to impart movement of the float to the rod by a pre-determined rising and lowering of water in the casing whereby the sleeve valve is actuated.

3. In combination, a tank, a valve adapted to be actuated for selectively directing liquid into the tank or to a point outside thereof, means for directing liquid into the valve, a pivotally mounted rocker arm connected to the valve and means comprising a casing having siphonic communication with the tank and a float having limited free movement in said casing for actuating the rocker arm.

4. A liquid level control comprising a casing adapted to be disposed in a body of liquid, a siphon tube for filling and emptying the casing of liquid from said body, a float in said tank, a rod extending through the float and movable independently thereof, means on the rod for abutment by the float whereby the rod may be intermittently actuated in opposite directions as the float reaches predetermined positions, a two way valve for directing liquid into the tank or to a point outside thereof, and an arm having a fixed pivotal mounting and connected at its opposite ends to the rod and valve.

5. In an automatic control the combination of a tank for receiving liquid, a two way valve controlling liquid to the tank, and a float mechanism adapted to actuate the valve when the liquid in the tank reaches predetermined high and low levels in said tank said mechanism comprising a casing having siphonic connection with the tank, a float having limited free movement in the casing and a rocker arm connected to the valve and arranged for deferred but rapid movement by the float after predetermined movement of the float.

6. The combination with a liquid circulating tank having uncontrolled outlet pipe and inlet pipe, of a valve in the inlet pipe and capable of diverting liquid from the tank, a float casing in the tank and having siphonic communication with the interior of the tank, an actuating linkage for the valve depending into said casing and a float in the casing arranged for limited independent movement on the depending portion of the linkage whereby the valve is permitted to remain stationary while the inflowing liquid attains a high level determined by the top of the siphon and the casing accumulates a predetermined quantity of liquid for moving the float therein independent of the linkage, further rise of the liquid in the casing serving to actuate the linkage and valve to effect substantially instantaneous closing of the valve to shut off further inflow of liquid into the circulating tank and permitting the uncontrolled outlet to discharge liquid from the tank, the siphonic communication between the tank and float casing again permitting limited free movement of the float on the linkage whereby to attain deferred but instantaneous opening of the valve.

In testimony whereof, I have hereunto subscribed my name this 16th day of April, 1927.

VICTOR ROSENHAGEN.