

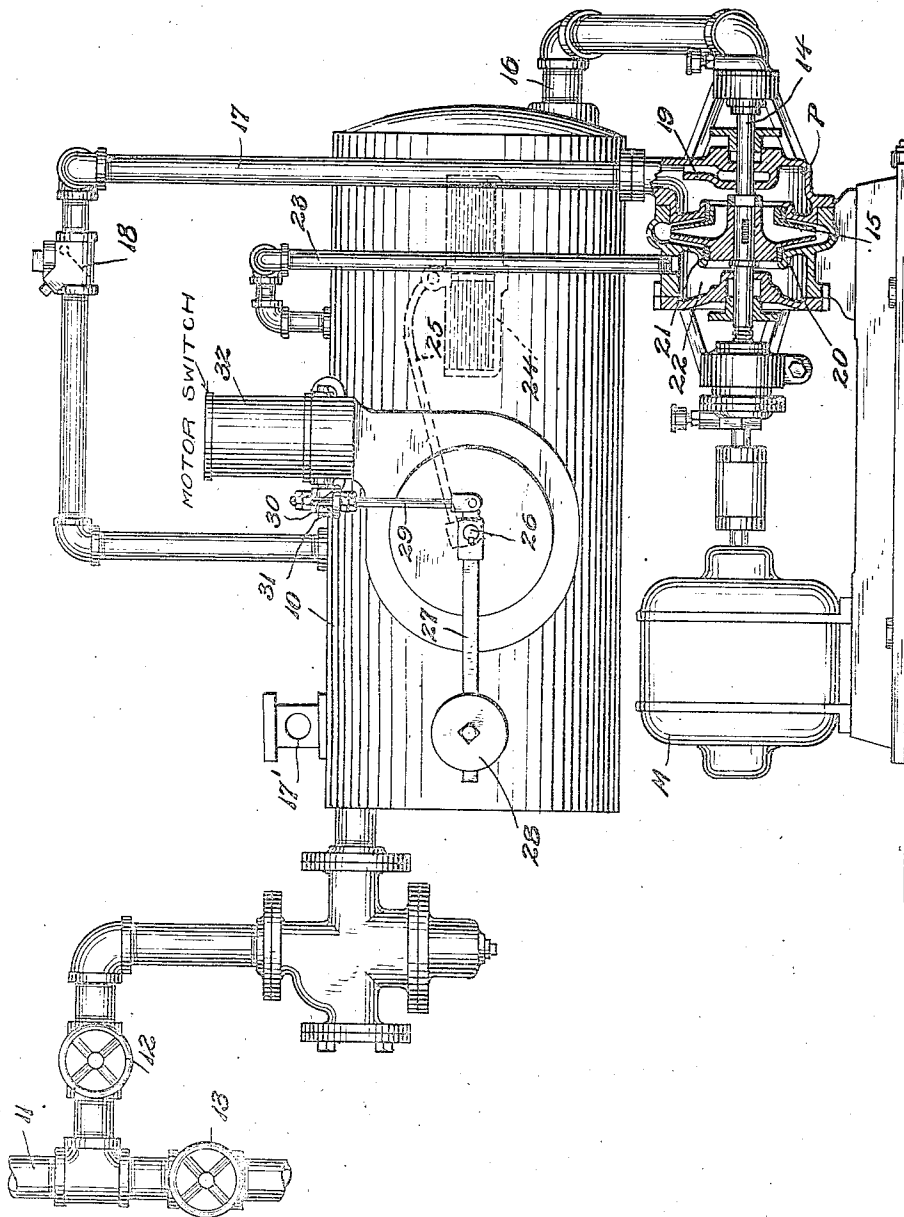
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I. C. JENNINGS

PUMPING APPARATUS

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INVENTOR

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UNITED STATES PATENT OFFICE.

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PUMPING APPARATUS.

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To all whom it may concern:

Be it known that I, IRVING C. JENNINGS, a citizen of the United States, and resident of South Norwalk, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Pumping Apparatus, of which the following is a specification.

This invention relates to a pumping apparatus and particularly to an apparatus of this class designed and constructed to collect and pump the water of condensation from a steam heating system to a boiler, hot well, or reservoir. Certain features of the invention, however are of a general character and may be applied to pumps used for other purposes, and having no connection to a steam heating system. The invention comprises essentially a receiving tank in which the water of condensation flowing back in the return pipes of a steam heating system is collected, a rotary centrifugal pump for forcing the water thus accumulated to a boiler, hot well or reservoir, and means governed by the depth of water in the receiving tank for controlling the operation of the pump, that is, for controlling the power means which runs the pump.

It is an object of the invention to provide a centrifugal pump which is particularly adapted to be operated intermittently, means being provided whereby the rotary impeller may be freed of the air which gathers therein each time the pump is shut down and which would greatly decrease the operating efficiency of the pump if it could not readily escape when the pump is again started. Another object of the invention is to prevent air from entering the suction chamber of the pump in the first instance, a novel shield or baffle plate being provided within the suction chamber for the purpose of directing any air which may leak through the packing surrounding the shaft of the pump, upward and away from the rotary impeller. A still further object of the invention is to provide a chamber in rear of

the rotary impeller in which water leaking past the bearing of the impeller from the pressure side may be collected. A fourth object of the invention is to provide means whereby a water pan secured upon one end of a switch operating lever in an inaccessible position within the receiving tank, may be kept filled with water so that the lever balances at all times and will operate the switch whenever the depth of water within the receiver exceeds a certain definite amount. For this purpose a pipe or conduit is provided, one end of which is in communication with the collecting chamber in the pump and the other end of which opens into the receiver in such position that water flowing therethrough from the pump to the receiver will drop into the water pan of the switch operating lever.

Other features of the invention will become apparent to those skilled in the art as it is disclosed in the following description and in the accompanying drawings, in which the receiving tank, centrifugal pump, and connecting pipes are illustrated, the pump being in section and the tank in elevation.

The receiving tank 10 is connected through a suitable straining device with the return pipe 11 of a heating system in such manner that the water of condensation from such system flows into the upper part of the tank by gravity. A valve 12 in the connecting pipe may be closed and a valve 13 in the pipe 11 may be opened, if desired, so that the water of condensation may be by-passed for any reason. Positioned below the tank 10 is a centrifugal pump P the shaft 14 of which is connected to an electric motor M by means of which it may be rotated to rotate the impeller 15. A pipe 16 connects the lower portion of the tank to the casing of the pump on the inlet side of the impeller, and a pipe 17 having a non-return valve therein connects the suction chamber of the pump with the upper portion of the receiving tank. A vent 17' in the top of the tank is open for the passage of air at all

times. A baffle plate 19 is located within the suction chamber, this plate being substantially parallel to the end wall of the pump and having its edges continuously connected thereto with the exception of its top edge so that any air passing through the shaft bearing in the end wall of the pump will be deflected upwardly by the baffle plate and will tend to rise through the pipe 17 instead of entering the inlet openings of the impeller.

A transverse partition 20 is provided in rear of the impeller, this partition having a central, circular aperture provided with a cylindrical bearing surface on which an antifriction ring 21 mounted on the impeller, bears. In the operation of the pump a slight leakage occurs between the ring 21 and its seat in the partition 20 and this leakage is collected in the chamber 22, between the partition and the rear end wall of the pump. Connecting the chamber 22 to the top of the tank 10 is a pipe 23 the upper end of which is positioned immediately above a water pan 24 which is pivotally connected to an arm 25 fast on the shaft 26 which extends transversely of the tank. To the outer end of the shaft 26 and positioned without the tank is a second arm 27 having a slidable weight 28 thereon and which is connected by a link 29 with a lever 30 mounted on the shaft 31. The shaft 31 extends within a casing 32 in which is located an electric switch for controlling the motor M. Up and down movement of the link 29 causes the rocking of shaft 31 which in turn operates the switch.

In the operation of the apparatus the valve 13 is closed and the valve 12 is opened so that the water of condensation flows from the pipe 11 into the tank 10. Assuming the switch to be open and the pump inoperative, water will collect in this tank until the pan 24 is partially submerged, whereupon it will be lifted, due to the buoyant effect of water, arm 25 raised, shaft 26 rotated, link 29 raised and the switch controlling the electric motor closed. The pump will then withdraw water from the tank and force it into a boiler or hot well until the water level has fallen to the level of the upper end of the pipe 16 when the switch mechanism will again operate to open the motor circuit and stop the pump. While the pump is inactive the water again slowly accumulates and the process is repeated.

During the inactive periods air may collect in the suction chamber of the pump and such air will tend to render the operation of the pump inefficient when the latter is again started due to the fact that it is not readily displaced from the impeller by the water coming down through the pipe 16. The pipe 17 however readily per-

mits the flow of air upwardly from the suction chamber so that the water flowing into the suction chamber can readily pass into the eye of the impeller. After the pump is started and suction is of course created on the suction side of the pump a non-return valve 18 prevents the flow of air downwardly through the pipe 17 to hinder its operation. Water leaking past the impeller and into the chamber 22 will pass upwardly through the pipe 23 and fall into the pan 24 which will thereby be maintained at all times full of water. The baffle plate 19 will deflect any air which may leak through the packing around the shaft bearing, upwardly, so that instead of entering the impeller it will pass into the pipe 17.

It has heretofore been found in devices of this general character that the float provided for controlling the switch included in the motor circuit often sticks so that the pump will either not operate at the proper time or operate continuously. The switch operating mechanism illustrated is adapted to exert a large torque about the shaft 26 and its construction is such that there is practically no possibility of sticking.

The invention may be embodied in other forms if desired, it being obvious that the design and arrangement of the component parts may be varied to suit different conditions.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:

1. In a pump, in combination, a casing, a rotatable shaft journaled in the casing and means for deflecting upwardly air leaking into the casing between the rotatable shaft and its bearing.

2. In a pump, in combination, a casing, a rotatable shaft journaled in the casing and a baffle plate spaced from the wall of the casing for upwardly deflecting air which may leak into the casing between the rotatable shaft and its bearing.

3. In a pump, in combination, a casing, a rotatable shaft journaled in the casing and a baffle plate spaced from the wall of the casing, and having an aperture through which the rotatable shaft extends, the edges of the baffle plate being continuously connected to the wall of the casing except at the top, whereby air which may leak into the casing between the rotatable shaft and its bearing is deflected upwardly.

4. A centrifugal pump including in combination, an impeller, a casing having an inlet chamber in communication with the eye of the impeller and having an outlet for air, a shaft extending through a wall of the casing and carrying said impeller, and means to direct to said air outlet, air

that may leak around the shaft into said chamber.

5. In apparatus of the class described, in combination, a pump casing having a chamber therein for collecting liquid which has leaked from the pressure side of the impeller, a liquid collecting tank, mechanism associated with said tank for controlling the

depth of water therein including a pan within the tank normally containing water, 10 and a conduit connecting said pump casing and tank, above the pan, for conducting the leakage from the pump to the pan to maintain the proper amount of water therein.

In testimony whereof I affix my signature.

IRVING C. JENNINGS.