

UNITED STATES PATENT OFFICE.

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STEAM-CONDENSER.

SPECIFICATION forming part of Letters Patent No. 785,614, dated March 21, 1905.

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To all whom it may concern:

Be it known that I, AXEL H. HELANDER, of Pueblo, Pueblo county, Colorado, have invented a new and useful Steam-Condenser, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a vertical section of a condenser embodying my apparatus. Fig. 2 is a vertical section of a part on a larger scale. Fig. 3 is a detail view of the float-valve. Fig. 4 is a horizontal section of the condensing-chamber.

The purpose of my invention is to reduce to a minimum the quantity of water required for condensation of steam and other vapors. It is particularly applicable to jet-condensers wherein the steam to be condensed is brought into actual contact with the water and the liberated air and vapor are drawn away by an air-pump or other exhauster. For a given vacuum the quantity of water required for condensation will vary with the temperature of the water and the quantity of steam to be condensed. If too much water is used for condensation, power is wasted in pumping it.

The object of my invention is to provide devices whereby the condenser may be so regulated that for the quantity of steam to be condensed and for the temperature of the water used for condensation the vacuum produced by the condensation of the steam may be maintained at, or nearly at, the theoretical vacuum with the minimum quantity of water. I attain these results with the apparatus illustrated in the accompanying drawings, in which means are shown for decreasing the vacuum in the main condensing vessel, heating the vapors drawn by the exhaust-pump from the condenser, and thus expanding the vapors in volume when it is necessary to restore to the condenser a counter-current, which for some reason has been changed to a parallel current. This may be done in various ways, and I illustrate in the drawings the preferable means by which it may be accomplished within the meaning of my invention.

In the drawings, 2 is the main condensing-chamber.

3 is the pipe through which the exhaust-steam to be condensed is introduced thereinto.

4 is the pipe by which the cold water for effecting the condensation is delivered to the top of the condensing-chamber by a pump 5, drawing its supply of cold water preferably from a tank or cold well 6, fed by a pipe 7. The water as it enters the condensing-chamber is divided by perforated pans 8 9 10 and falls through the condensing-chamber in a multitude of fine streams.

11 is a tail-pipe which discharges the water from the condensing-chamber into a hot-well 12, overflowing at 13 to the sewer.

14 is a separating-chamber connected with the top of the condensing-chamber 2 by a pipe 15 and having a tail-pipe 16, leading to the well 12.

17 is a float-chamber connected with the bottom of the chamber 14 by a passage 18, connected also with the upper part of the chamber 14 by a pipe 19 and connected with the stand-pipe 16 by a pipe 20. This float-chamber has a pipe 21, connecting it with one end of a coil 22, arranged within a hot portion of the condensing-chamber 2, the other end of the coil being connected with the separating-chamber 14 by a passage 22'.

The float 23 has two valves 24 and 25, controlling, respectively, ports 26 and 27, the ports 27 connecting the suction-pipe 28 of the pump 29 with the pipe 21 and the ports 26 connecting the pipe 28 with the float-chamber and with the pipe 19, which opens thereinto.

An excessive vacuum in the chamber 2 will cause the water to accumulate in the chamber 14, whereupon the float 23 will rise, and the valves 25 24 being moved thereby will first uncover the ports 27 and establish communication between the air-suction pipe 28 and chamber 14 by way of the coil 22 and pipe 21. The valve moving still further will close the ports 26, and thereupon the direct communi-

cation of the colder vapors from the chamber 14 to the air-pump will be shut off. Thus the current is by-passed from the top of the chamber 2, and communication will be established through the hottest part of the chamber before delivering it to the air-pump, so that the vapors which pass to the air-pump from the chamber 14 must first pass through the coil 22 and pipe 21, and being heated in the coil, and thus increased in volume, their pressure will increase. This will have the effect of decreasing the vacuum in the condensing vessel 2, and water in large quantities will therefore cease to enter the chamber 14 from the pipe 15, and the condensation will take place substantially in the vessel 2. This will cause the float to fall, reversing the valves 24 and 25, bringing them to their original positions, thus first opening direct communication between the air-pump, suction-pipe 28, and separating-chamber 14 by reason of the valve 24 opening the ports 26, and then shutting off the by-pass by reason of the valve 25 closing the ports 27. Then and under normal conditions condensation will take place in the vessel 2. The non-condensable vapors will accumulate in the top of the same, whence they will be extracted by the air-pump through the separating-chamber 14, float-chamber 17, and pipe 28.

Within the scope of my invention as defined in the claims other changes may be made by those skilled in the art, since I believe I am the first to use means of any kind for regulating the condenser by increasing the volume of the non-condensable vapors by subjecting them to a source of heat either in the condenser or in any other heating-chamber

heated by exhausted steam or otherwise. I therefore desire to claim the same broadly.

I claim—

1. In a steam-condenser, the combination with an exhauster and a condensing vessel, of means for automatically regulating the condensation by reheating the vapors supplied by the condensing vessel and thereby decreasing the vacuum in the condensing vessel; substantially as described.

2. A steam-condenser having a condensing vessel, an exhauster, a separating-chamber and means controlled by the level of the water in the separating-chamber for shifting the path of the vapors from the condensing vessel to or from a reheating device; substantially as described.

3. A steam-condenser having a condensing-chamber, a separating-chamber, an exhauster, passages extending to the exhauster respectively directly from the separating-chamber and indirectly through a hot part of the condensing-chamber, and means for diverting the connection of the pump from one passage to the other; substantially as described.

4. A steam-condenser having a condensing-chamber, a separating-chamber, an exhauster, and means whereby the vapors may be led to the exhauster from the separating-chamber through a reheating device; substantially as described.

In testimony whereof I have hereunto set my hand.

AXEL H. HELANDER.

Witnesses:

CHAS. J. FLEISCH,
W. EDWARD BERG.