E. W. CHRISTIE.

CONDENSING APPARATUS.

APPLICATION FILED JUNE 19, 1920.

1,393,499. Patented Oct. 11, 1921.

Fig. 1

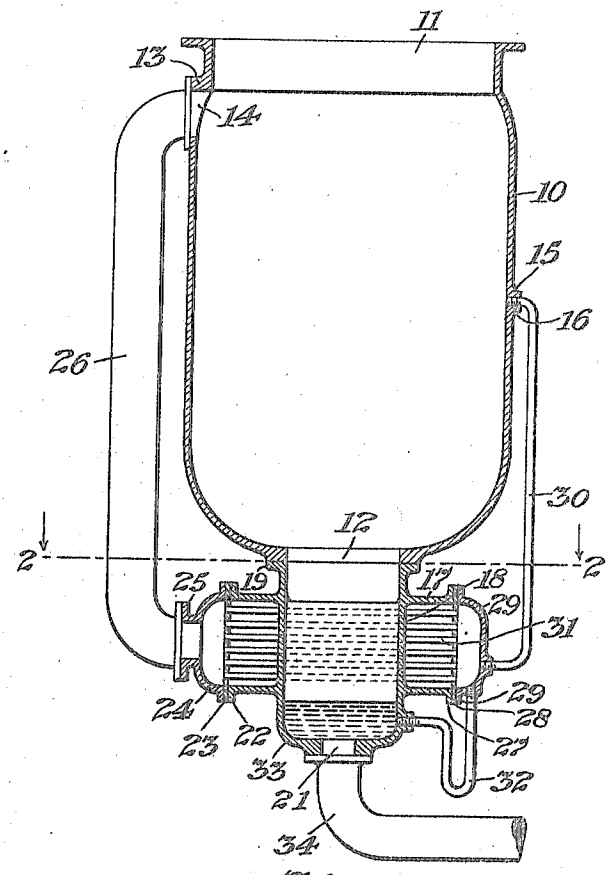


Fig. 2

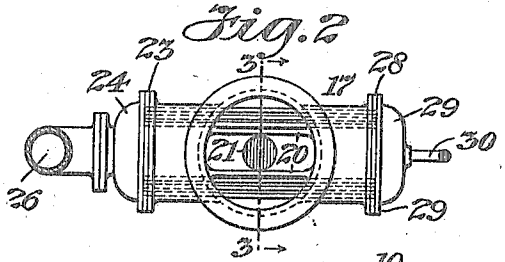
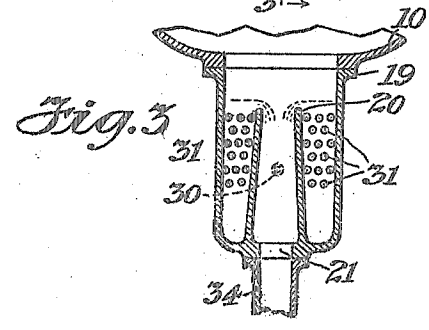


Fig. 3



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CONDENSING APPARATUS.

1,393,499. Specification of Letters Patent. Patented Oct. 11, 1921.

Application filed June 19, 1920. Serial No. 390,073.

To all whom it may concern:

Be it known that I, EVI W. CHRISTIE, a citizen of the United States, residing at Sewaren, in the county of Middlesex and State of New Jersey, have invented an Improvement in Condensing Apparatus, of which the following is a specification.

This invention relates to an improvement in condensing apparatus and more particularly to devices for heating the condensate in surface condenser practice. At the present time, so far as I am aware, there are commonly employed two ways in which the temperature of the condensate in surface condenser practice is increased. In one way, the condensate is prevented from dripping on the cooler tubes in the condenser to prevent a reduction of temperature in the condensate, and in the other way a heater, generally known as the Volz heater, is placed in the upper part of the condenser and through which the condensate is pumped by the hot well pump. The first of these ways is unsatisfactory, and in the use of the second way there is an additional head put on the hot well pump, and beside the use of the heater is not applicable in all cases.

The object of my invention is to overcome the usual difficulties encountered in heating the condensate in surface condenser practice and in doing so the apparatus employed includes a heating element which is incorporated in the hot well and which is placed in direct communication with exhaust steam or a portion of the exhaust steam as the same enters the surface condenser, and the hot well heater preferably is operated on the dead end principle.

In carrying out the invention, the hot well heater is designed to be associated preferably in direct contact with the surface condenser so that the condensate discharges directly into the body of the hot well heater in which there are a series of tubes or conduits arranged to receive the exhaust steam, and which are so placed in the body of the hot well heater as to be completely submerged in order that, as will be readily understood, the temperature of the condensate may be increased by the transfer of the heat from the exhaust steam to the condensate in the heater, and the apparatus made in accordance with my invention will be hereinafter more particularly described.

In the drawing:

Figure 1 is a transverse section through a surface condenser and a central longitudinal section through the hot well heater showing the parts in their associated relationship, as well as the pipe connections employed with the same.

Fig. 2 is a sectional plan on line 2—2, Fig. 1, and

Fig. 3 is a transverse section of the hot well heater taken on line 3—3, Fig. 2.

Referring to the drawing, the body or shell of the surface condenser is indicated at 10. This, as is customary, is provided with an exhaust steam inlet 11. As illustrated, this exhaust steam inlet 11 is in the top of the condenser shell, although manifestly it might be arranged in any other position. The condenser shell is also provided with a condensed steam or condensate outlet 12 which, as illustrated, is placed in the bottom of the shell. The condenser shell on one side adjacent the top thereof is also provided with a boss 13 through which portion of the shell there is an opening 14, the use of which will be hereinafter described. As illustrated, in the opposite side of the condenser shell there is a relatively small boss 15 at which portion of the shell there is an opening 16, the use of which will also be hereinafter described. The condenser employed, as will be understood, is of the usual surface condenser type.

The hot well heater to which the present invention more particularly relates, comprises a body or shell 17 which may be of any desired configuration and interiorly is provided with transverse walls 18, these walls being of a predetermined width and extending from the lower to the upper walls of the body of the heater. The hot well heater is also fitted with a flanged nozzle 19 by which and suitable bolts or otherwise it may be connected to the lower part of the shell of the condenser to make communication from the interior of the condenser through the outlet opening 12 to the interior of the hot well heater. The body of the hot well heater is also provided with interior longitudinal walls 20 which, with the transverse walls 18, form a discharge passage in the hot well heater leading to the discharge opening 21 in the bottom of the heater, it being understood that the con-

densate in the body of the heater in the discharge thereof flows over the tops of these longitudinal walls through the passage defined by these walls and the transverse walls to the heater discharge opening 21.

At one end of the body of the hot well heater there is a flange 22 and this is fitted with a tube plate 23 and a bonnet 24, these parts being connected by bolts or otherwise as is customary. In the bonnet 24 there is a flanged nozzle 25 by which communication is made through a pipe 26 and the opening 14 in the condenser shell to that portion of the interior of the condenser adjacent the exhaust steam inlet thereof. At the opposite end of the hot well heater shell there is a flange 27 similar to the flange 22 and at this end of the shell of the hot well heater there is also a tube plate 28 and a bonnet 29, these parts being secured together by bolts or otherwise as is customary, and the space within the bonnet 29 and between the same and the tube plate 28 is connected to the interior of the condenser shell 10 by a pipe 30 or otherwise. Extending between the tube plates 23 and 28 and suitably connected at their ends there is a plurality of tubes 31, these tubes extending through the entire body of the hot well heater as will be understood and being completely submerged by the condensate which passes from the condenser to the hot well heater.

A pipe bent in the form of a U to form a trap is connected at one end to the wall 33 forming the lower end of the discharge portion of the hot well heater and at the other end in the bonnet 29 so as to make communication between the lower end of the discharge of the hot well heater and the space between the bonnet 29 and the tube plate 28 so that any steam that may condense will drain back into the discharge of the hot well. The discharge opening in the hot well is connected by a pipe 34 to the hot well pump as is customary.

In the use of this apparatus, the exhaust steam is conveyed to the space within the condenser shell and is condensed by coming into contact with the tubes therein through which circulating water is continuously passed to maintain the temperature thereof sufficiently low to condense the steam, while the condensed steam or condensate passes to the bottom of the condenser and through the discharge opening 12 into the interior of the hot well heater, at the same time a portion of the exhaust steam as conveyed to the condenser passes through the opening 14 and through the pipe 26 so as to fill the tubes 31 extending through the body of the hot well heater in order that the heat from this exhaust steam may be transferred through the tubes to the condensate in the hot well heater in which the tubes are submerged. It will be understood, of course, that any part of this exhaust steam which may condense in the tubes in the hot well heater will drain to the space between the bonnet 29 and the tube plate 28 and will be trapped to the discharge of the heater, while provision is made for the passage of exhaust steam unutilized in the hot well heater through the pipe 30 to the interior of the shell 10 of the main condenser, it being also understood that in use condensate fills the body of the hot well heater inasmuch as in leaving the same it must overflow the longitudinal walls 20 to reach the discharge passage and the outlet from the hot well heater.

I claim as my invention:

1. In a condenser apparatus and in combination, a condenser, a hot well associated therewith, a plurality of tubes extending through the body of the hot well, devices in the hot well discharge for maintaining the condensate in the hot well at such a level as to submerge the tubes, and means for directing steam into the tubes in the hot well.

2. In a condenser apparatus and in combination, a condenser, a hot well connected to the said condenser, a plurality of tubes passing through the body of the hot well, interior walls in the body of the hot well forming a discharge passage therein over which walls the condensate is caused to flow in leaving the hot well so that the said tubes are submerged in the condensate, and means for directing exhaust steam from the condenser to the tubes in the hot well.

3. In a condenser apparatus and in combination, a condenser, a hot well connected to the said condenser, a plurality of tubes extending through the body of the hot well, transverse walls in the body of the hot well, longitudinal walls also in the body of the hot well and acting in conjunction with the transverse walls to form a discharge outlet passage from the hot well, the condensate flowing over the said longitudinal walls through the discharge passage so that the tubes in the hot well are submerged, and means for directing exhaust steam from the condenser to the said tubes in the hot well.

4. In a condenser apparatus and in combination, a condenser, a hot well connected to the said condenser and comprising an open ended body member, tube plates and bonnets connected to the ends of the said body member, a plurality of tubes extending between and connected in the said tube plates, a connection between the said condenser and one end of the hot well body for conveying exhaust steam from the condenser to the tubes in the hot well, and means within the body of the hot well for maintaining sufficient condensate therein to submerge the said tubes in the operation of the apparatus.

5. In a condenser apparatus and in combination, a condenser, a hot well connected

to the said condenser and comprising an open ended body member, tube plates and bonnets connected to the ends of the said body member, a plurality of tubes extending between and connected in the said tube plates, a connection between the said condenser and one end of the hot well body for conveying exhaust steam from the condenser to the tubes in the hot well, oppositely disposed transverse walls in the body of the hot well, and spaced longitudinal walls also within the body of the hot well coöperating with the said transverse walls to form a discharge passage for the condensate over which said longitudinal walls the condensate flows to the discharge passage so that the said tubes are submerged in the condensate in the operation of the apparatus.

Signed by me this 14 day of June 1920.

EVI W. CHRISTIE.