J. L. ZEIGLER.

STEAM CONDENSER AND PURIFIER.

APPLICATION FILED DEC. 14, 1909.

1,020,675. **Patented Mar. 19, 1912.**

Fig. 1.

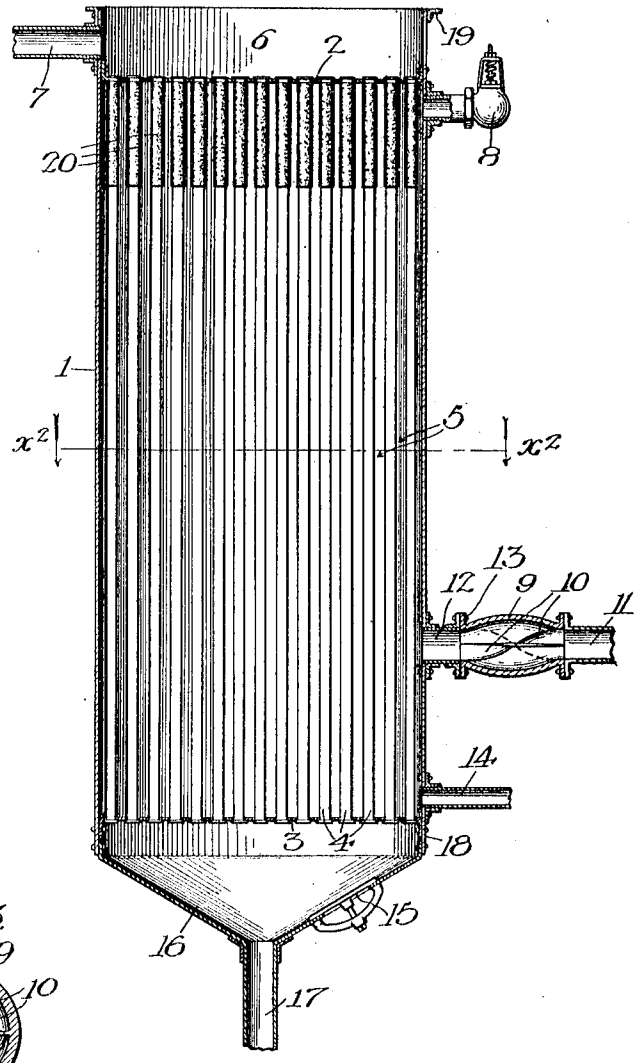


Fig. 3.

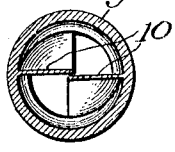
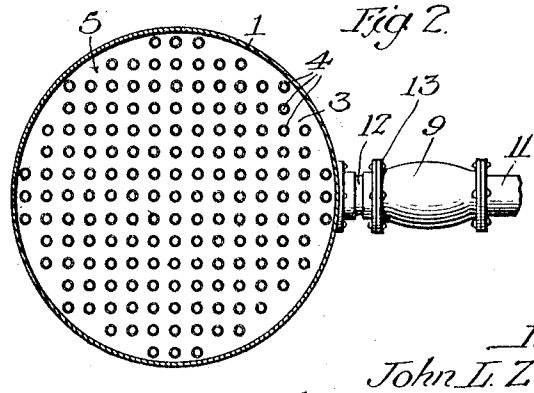


Fig. 2.



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UNITED STATES PATENT OFFICE.

JOHN L. ZEIGLER, OF LOS ANGELES, CALIFORNIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO VERTICAL CONDENSER COMPANY, A CORPORATION OF CALIFORNIA.

STEAM CONDENSER AND PURIFIER.

1,020,675. Specification of Letters Patent. Patented Mar. 19, 1912.

Application filed December 14, 1909. Serial No. 533,098.

To all whom it may concern:

Be it known that I, JOHN L. ZEIGLER, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Steam-Condenser and Purifier, of which the following is a specification.

My invention relates to that class of water condensers in which steam is condensed for ice manufacturing purposes as well as drinking purposes, and has for one of its objects the condensation of steam and the freeing of the water from any gases which may be carried by the steam.

Another object of my invention is to provide a condenser and purifier which can be operated continuously without the necessity of ceasing the operation for cleaning purposes.

Another object of my invention is to provide means in a condenser whereby a motion will be imparted to the steam, which will have a tendency to liberate all gases from the same and permit their separation from the water condensed from the steam and also permit the escape of the gases from the condenser.

Another object of my invention is to provide a steam condenser and purifier which will be simple in construction, and which can be easily repaired.

The accompanying drawings illustrate my invention.

Figure 1 is a vertical section of the condenser and purifier. Fig. 2 is a horizontal section on line x^2—x^2 Fig. 1. Fig. 3 is a cross section of the means for imparting a whirling motion to the steam.

1 is the shell of the condenser and purifier which is preferably formed from boiler iron and is circular in cross section.

2 is a top flue sheet and 3 is a bottom flue sheet, which flue sheets are located within the circular shell 1 near the top and bottom respectively of the shell.

4, 4 are flues mounted in the flue sheets 2 and 3 and forming water passage-ways through the steam space 5 within the shell.

6 is a flange extending above the flue sheet 2.

7 is a drain communicating with the space within the flange 6.

8 is a relief valve adapted to permit the escape of gases from the upper portion of the chamber 5.

9 is a hollow body provided with internal flanges 10 formed spirally within such hollow body.

11 indicates a pipe leading from a suitable steam supply.

12 is a collar fastened to the shell 1, and 13 are fastening means to fasten the hollow body 9 to such flanges.

14 is a drainage from the bottom of the chamber 5.

15 is a man-hole to allow admission into the conical bottom 16.

17 is a pipe adapted to supply cooling water from a suitable source of water supply, not shown. The flue sheet 3 rests upon an upwardly extending flange 18 of the conical bottom 16 within the shell 1. A reinforcing angle collar 19 is arranged above the top of the flange 6.

20, 20 indicate heat "insulating jackets" about the upper end of the flues below the top flue sheet 2.

In operation, steam is admitted to the chamber 5 through the pipe 11 and hollow body 9. The spirally arranged flanges 10 within the hollow body 9 impart a gyratory or whirling motion to the steam, and the same is thrown against the flues 4, 4, thereby agitating the steam and breaking it up and causing the steam to be distributed throughout the cylindrical shell. The point of admission through collar 12 is located at a distance above the lower flue sheet 3 sufficient to allow of the incoming steam to be above and out of the influence of the condensed water in the bottom of the chamber 5.

Cold water is admitted to the conical bottom 16 through the pipe 17 and flows upwardly therefrom through the flues 4, 4 into the flange 6 and outwardly therefrom through the outlet pipe 7. The upwardly flowing cooling water causes the steam admitted through the collar 12 to be condensed, and when so condensed it will flow downwardly along the flues 4, 4 and the shell 1 to the bottom where it is collected and allowed to flow outwardly through the outlet pipe 14.

The whirling motion imparted to the incoming steam by the spiral flanges 10 distributes the steam throughout the entire area of the condenser and uniformly into contact with the flues 4, 4, and allows the cooling effect of the upwardly flowing water within the flues to extract the heat from the steam

and carry the same upwardly in the water within the flues. As the water carrying the heat extracted from steam progresses upwardly, it serves to maintain the temperature of the upper portion of the chamber at a degree of temperature slightly below the condensing point of steam, but is not cold enough to condense any gases of lubricating oils or other gases which may be combined with the steam, and such gases are allowed to collect in the upper portion of the chamber 5, and when such gases have attained a pressure sufficient to cause the relief valve 8 to act, such gases will be discharged through such valve. The water having performed the function of condensing the water from the steam and liberating the gases from the combination therewith will flow outwardly from the upper part of the condenser through the overflow pipe 7.

To prevent any condensation of the gases in the upper part of the chamber 5 in case the cooling water should not absorb sufficient heat from the steam to maintain a high enough temperature in the gas zone, or the cooling water should circulate so rapidly as to prevent its absorbing sufficient heat to maintain the temperature of the upper part of the chamber I have incased the upper ends of the flues in heat insulating jackets 20—20 to prevent such gases from giving up their heat to the circulating water in the flues. By insulating such flues I maintain the temperature of the gases in the upper part of the chamber and prevent any liability of their condensing and running down the flues or the shell to again mingle with the steam or the condensates of the steam.

My invention is particularly adapted for condensing and purifying steam from engines, and will liberate from such steam any gases formed from lubricating oils used in the engine and volatilized and carried therefrom by the steam. Furthermore, my invention will condense and purify such steam and prevent any oil from condensing into the water of condensation.

The heat from the steam will be sufficient to cause incrustation or deposit of scale to occur in the flues 4, 4 from the water flowing upwardly therethrough, and when such incrustation or deposit occurs the same can be effectually removed by inserting a suitable flue cleaner into the upper part of the flues and working such flue cleaner up and down therethrough.

The deposit cleaned from the inside of the flues will fall downwardly into the conical bottom 16. As the space above the top flue sheet 2 is open or exposed at the top, this operation may be performed while the condenser is in operation without interfering in any manner with the condensing process, and such operation may be performed often enough to prevent any deposit of scale within the flues, thereby keeping such flues in condition whereby the full cooling effect of the water may be exerted upon the steam.

The conical bottom 16, together with the flue sheet 3, forms a water chamber having an area sufficient to furnish a body of water beneath such flue sheet having a cooling surface of maximum capacity to absorb the heat from the water of condensation and to maintain the same at a low enough temperature to prevent its reheating and vaporization from the effect of the steam admitted into the chamber above the water of condensation. The flange 6 above the flue sheet 2 is of sufficient height to form a chamber which will contain water above the flue sheet 2 of considerable depth before such water will overflow into the outlet pipe 7. The flues 4, 4 may be made of any suitable flue material and may be thin enough to readily allow the heat of the steam to be absorbed by the water flowing upwardly through the uninsulated portions thereof.

I have discovered that by admitting steam to the condensing chamber at a point above the outlet for the condensate, and providing a chamber of sufficient height to allow the gases to ascend above the inlet point, that I avoid all liability of such gases condensing and avoid all liability of washing or carrying such gases downwardly into the condensate from the steam, as would occur if the inlet point of the steam was at or near the upper portion of the condensing chamber, and I have also discovered that by maintaining the temperature of the upper portion of the condensing chamber at a point above the condensing temperature of the gases formed from the lubricating oils used in a steam engine, that such gases being lighter than steam, or the condensate of steam, will seek the upper portion of the chamber and will escape through a suitably arranged valve, and that such gases when separated from the steam will not again combine with the same, and by preventing their condensation I am enabled to allow such gases to escape from the condenser in their vapor form.

By the use of my improved condenser and purifier, I am enabled to take exhaust steam from a steam engine and condense distilled water therefrom which is free from all gases or impurities, and I am enabled to utilize such water in the manufacture of ice without further boiling or purifying the same to drive off any excess of air therefrom.

The whirling motion imparted to the steam by the hollow body having the internal spiral flanges, produces a motion to the steam which causes any air or excess of oxygen combined with the steam to be separated therefrom and to rise to the upper portion of the chamber where it escapes through the relief valve.

What I claim is:—

1. A steam condenser and purifier comprising a vertical shell provided with a conical bottom with a bottom flue sheet above said conical bottom forming a water chamber, a top flue sheet and a flange above said top flue sheet forming an open topped chamber above the top flue sheet, flues extending vertically in the shell between the bottom and top flue sheets and establishing communication between the water chamber at the bottom and the open topped water chamber at the top of the shell, means for supplying water to the water chamber at the bottom, overflow means for leading water from the water chamber at the top, drainage means near the bottom of the shell above the bottom flue sheet, a steam supply pipe opening into the lower portion of the shell at the side thereof at a point above the flue sheet, and a vapor outlet from the upper portion of the shell below the top flue sheet.

2. A steam condenser and purifier comprising a vertical shell provided with a conical bottom with a bottom flue sheet above said conical bottom forming a water chamber, a top flue sheet and a flange above said top flue sheet forming an open topped chamber above the top flue sheet, flues extending vertically in the shell between the bottom and top flue sheets and establishing communication between the water chamber at the bottom and the open topped water chamber at the top of the shell, means for supplying water to the water chamber at the bottom, overflow means for leading water from the water chamber at the top, drainage means near the bottom of the shell above the bottom flue sheet, a steam supply pipe opening into the lower portion of the shell at the side thereof at a point above the flue sheet, and a vapor outlet from the upper portion of the shell below the top flue sheet, said vapor outlet means being provided with a relief valve maintaining definite pressure in the interior of the shell.

3. A steam condenser and purifier comprising a vertical shell provided with a conical bottom with a bottom flue sheet above said conical bottom forming a water chamber, a top flue sheet and a flange above said top flue sheet forming an open topped chamber above the top flue sheet, flues extending vertically in the shell between the bottom and top flue sheets and establishing communication between the water chamber at the bottom and the open topped water chamber at the top of the shell, means for supplying water to the water chamber at the bottom, overflow means for leading water from the water chamber at the top, drainage means near the bottom of the shell above the bottom flue sheet, a steam supply pipe opening into the lower portion of the shell at the side thereof, and a vapor outlet from the upper portion of the shell below the top flue sheet, said steam supply means being provided with a hollow member formed with internal flanges extending spirally to cause whirling motion of the steam as it enters the shell.

4. A steam condenser and purifier comprising a vertical shell provided with a conical bottom with a bottom flue sheet above said conical bottom forming a water chamber, a top flue sheet and a flange above said top flue sheet forming an open topped chamber above the top flue sheet, flues extending vertically in the shell between the bottom and top flue sheets and establishing communication between the water chamber at the bottom and the open topped water chamber at the top of the shell, means for supplying water to the water chamber at the bottom, overflow means for leading water from the water chamber at the top, drainage means near the bottom of the shell above the bottom flue sheet, a steam supply pipe opening into the lower portion of the shell at the side thereof, and a vapor outlet from the upper portion of the shell below the top flue sheet, and heat insulating means around the upper portion of the flues.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 6th day of December, 1909.

JOHN L. ZEIGLER.

In presence of—
F. M. TOWNSEND,
FRANK L. A. GRAHAM.