

(No Model.)

W. F. RAY.
WATER HEATER OR CONDENSER.

No. 602,521.

Patented Apr. 19, 1898.

Fig. 1.

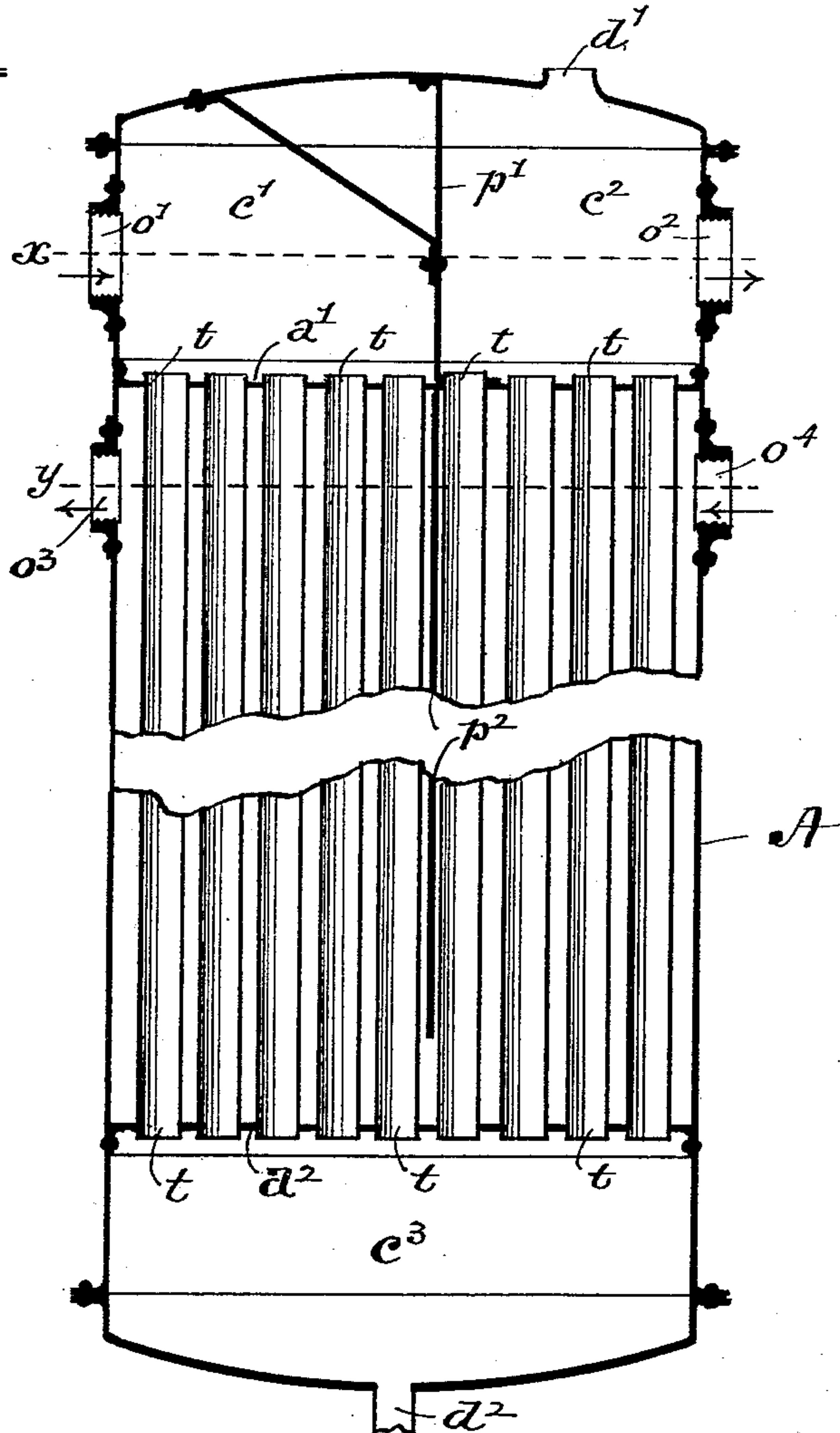


Fig. 2.

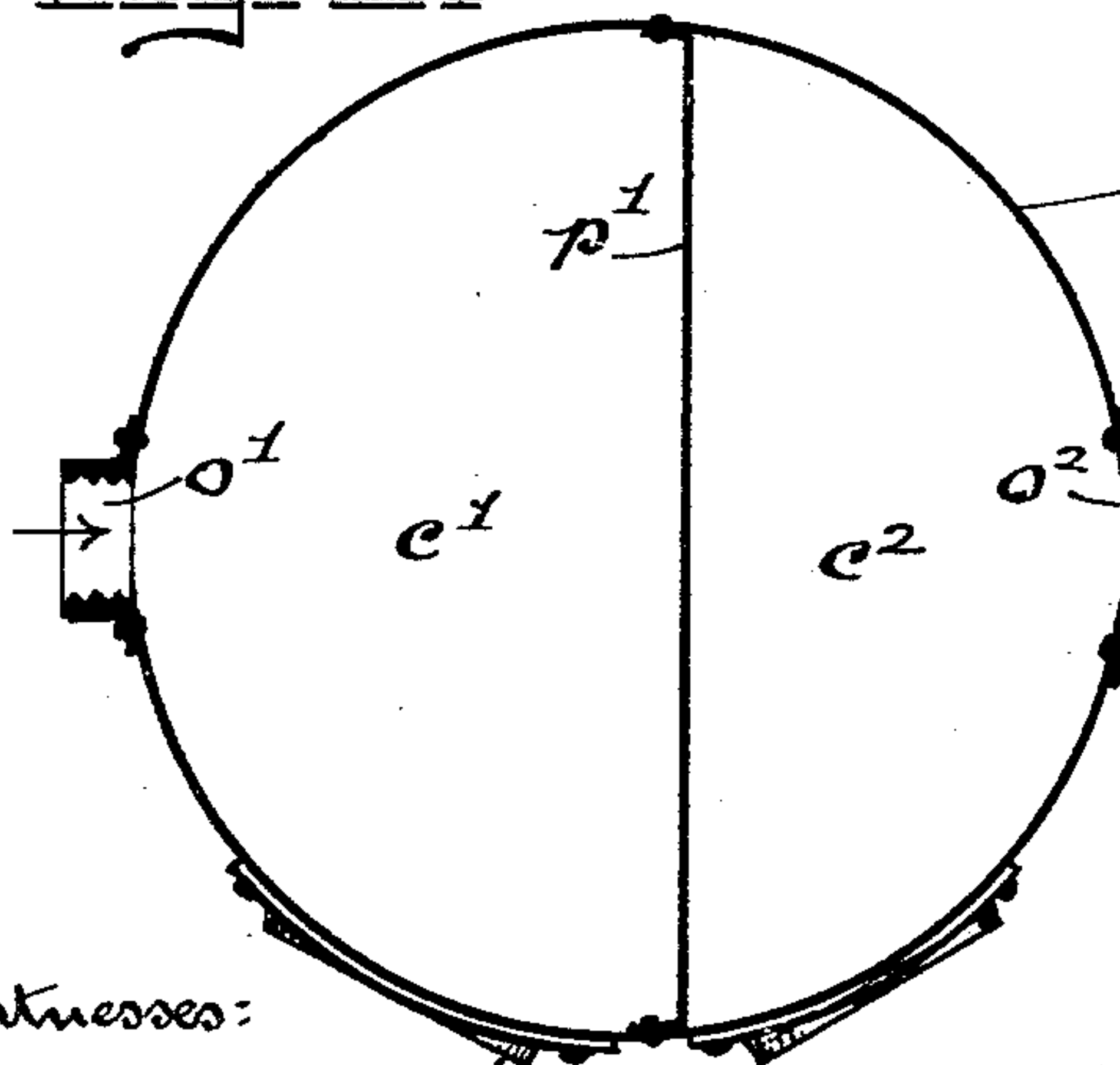
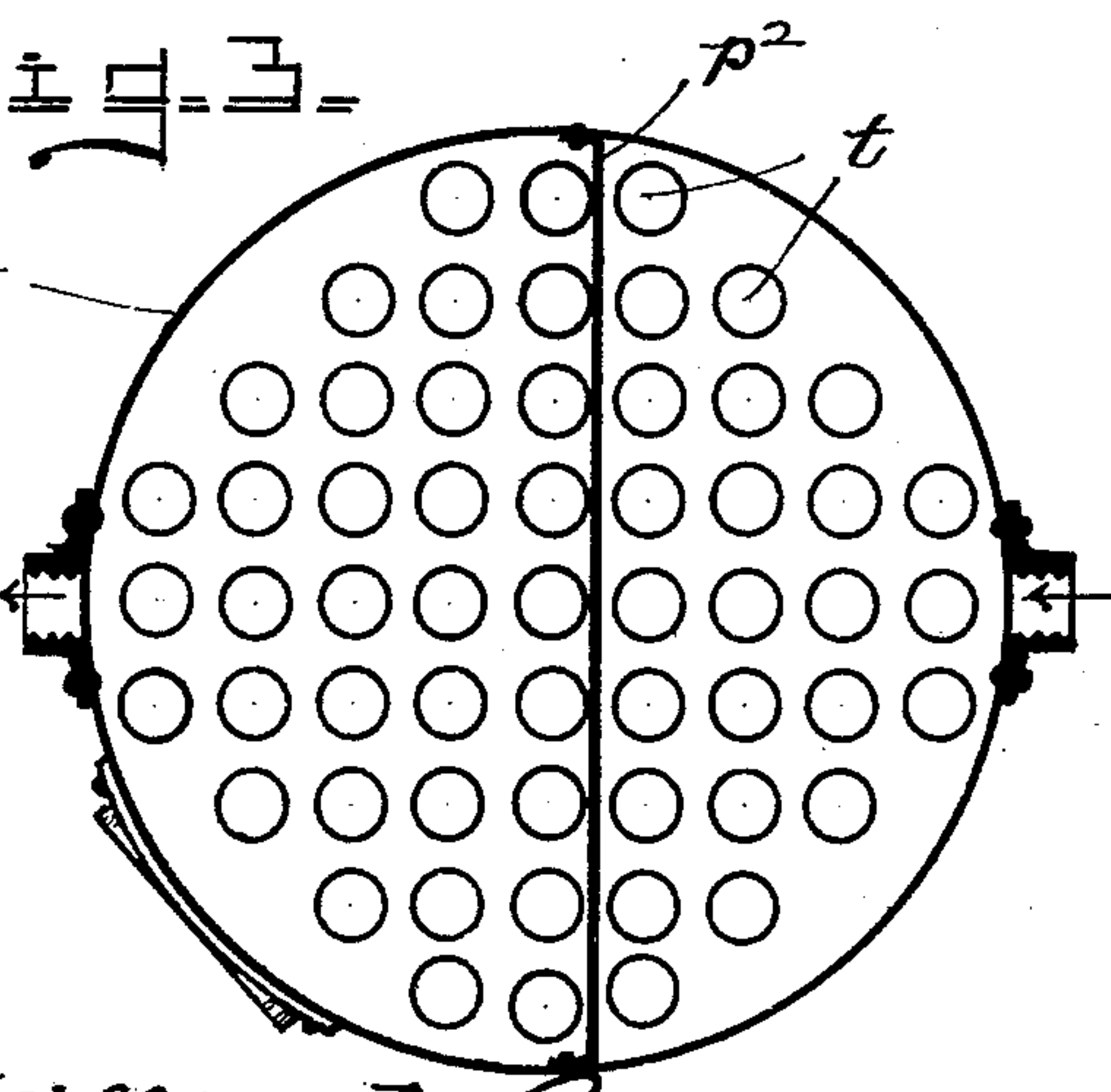


Fig. 3.



Witnesses:

James L. Foley,
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William F. Ray, Inventor,
by L. M. Hovea atty.

UNITED STATES PATENT OFFICE.

WILLIAM F. RAY, OF CINCINNATI, OHIO.

WATER-HEATER OR CONDENSER.

SPECIFICATION forming part of Letters Patent No. 602,521, dated April 19, 1898.

Application filed August 24, 1896. Serial No. 603,726. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. RAY, a citizen of the United States, residing at Cincinnati, Ohio, have invented new and useful Improvements in Water-Heaters or Condensers, of which the following is a specification.

My invention relates to water-heaters and steam-condensers, its object being to produce a convenient apparatus for utilizing waste steam for the double purpose of heating water and disposing of the steam to prevent its escape into the air where such escape is objectionable, and more particularly to accomplish these objects on a large scale at a minimum cost.

Where, for example, the steam from a driving-engine or steam from the mash-tubs of a distillery is to be discharged, it often happens that a free discharge into the atmosphere is objectionable, and my invention can be advantageously applied for the double purpose of condensing the steam more or less completely and at the same time heating water that otherwise would require extra fuel and appliances. As such steam is more or less contaminated with oil and other impurities it cannot be brought into direct contact with the water to be heated, and this is provided for in my invention by maintaining separate channels for water and steam.

To this end my invention consists in a drum or tank, preferably cylindrical, provided with diaphragms or cross-partitions near each end, connected by open-ended tubes extending through the space between the diaphragms and opening into the end chambers, with the further provision of a longitudinal partition dividing the upper chamber into two different portions, and a similar partition extending from the bottom wall of the upper chamber downward to near the lower diaphragm. An inlet enters one of the divisions of the upper chamber, whence the steam passes downwardly through the tubes entering that division into the lower chamber, whence it ascends through the tubes entering the second division of the upper chamber, and thence escapes by an outlet. An inlet enters near the top of the central space between the diaphragms, by which water enters and surrounds the tubes, being compelled by the partition to pass downward around its foot and

again upward, and finds egress at a point opposite the water-inlet.

By means of suitable manholes or by removing a top or bottom cap of the tank the tubes are easily cleaned of any accumulation of matter deposited by the steam. Where a large quantity of steam is to be disposed of, a number of such vessels may be connected in series.

My invention is illustrated in the accompanying drawings, in which—

Figure 1 is a vertical section of a heater or condenser complete. Fig. 2 is a horizontal section on the line x of Fig. 1, and Fig. 3 is a horizontal section on the line y of Fig. 1.

Referring now to the drawings, A designates a cylinder of sheet-iron, and a' a^2 upper and lower diaphragms, respectively, between and through which are secured tubes t , placed as close together as convenient.

The upper space of the cylinder A above the diaphragm a' is divided axially by a vertical cross-partition p' , separating it into two chambers c' c^2 , the first being provided with an inlet-orifice o' and the latter with an outlet-orifice o^2 , both having suitable screw-collars or other means for the attachment of conducting-pipes.

The space between the diaphragms a' a^2 is divided vertically by an axial partition p^2 , extending from the upper diaphragm to near the lower one, as shown, and the shell of the cylinder A is provided immediately below the diaphragm a' at opposite sides of the vertical partition p^2 with outlet and inlet orifices o^3 o^4 , also provided with pipe connections.

The top of the cylinder A may be provided with a safety-valve opening d' and at the bottom with a drainage-opening d^2 , both provided with suitable appliances for the purposes indicated.

All the parts are constructed of the materials and in the manner of steam-boiler manufacture, and the outer shell is provided with manholes where required.

The mode of operation is as follows: Water admitted at inlet o^4 fills the interior space between the diaphragms around the tubes t to the level of the water-outlet o^3 , whence it escapes after passing first downward around the foot of the dividing-partition p^2 and thence to its outlet. Steam admitted by inlet o' to

the chamber c' passes downward through the tubes t , opening from said chamber, through the lower diaphragm a^2 , whence it rises through the remaining tubes t into the second upper chamber c^2 to its outlet o^2 .

It will be seen that the mass of steam is greatly subdivided by the tubes, which are surrounded with water, and if the latter be cool on entering a considerable interchange of heat takes place through the metal tubes, whose conductivity for heat is great.

One or both ends of the cylinder A may be made removable, and thus afford convenient access to the tubes, which may thus be readily cleansed, while an accumulation of condensed water, oil, &c., will collect in the chamber c^3 and is thence readily drawn off by the drain d^2 .

I claim as my invention and desire to secure by Letters Patent of the United States—

A water-heater or steam-condenser embodying a vertical cylinder divided by horizontal partitions into three chambers, the upper and

lower being connected by tubes through the partitions and intermediate chamber; a vertical partition dividing the upper chamber and a similar partition dividing the upper portion of the central chamber to near the bottom; a steam inlet and outlet to the upper chamber entering at opposite sides of its partition and an outlet from the lower chamber; whereby the steam entering the upper chamber passes first downward and then upward through the central chamber; the water entering oppositely passes first downward and then upward around the central partition, and the condensed steam of the operation collects in and is drawn off from the lower chamber, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM F. RAY.

Witnesses:

L. M. HOSEA,

JAMES L. FOLEY.