

No. 827,479.

PATENTED JULY 31, 1906.

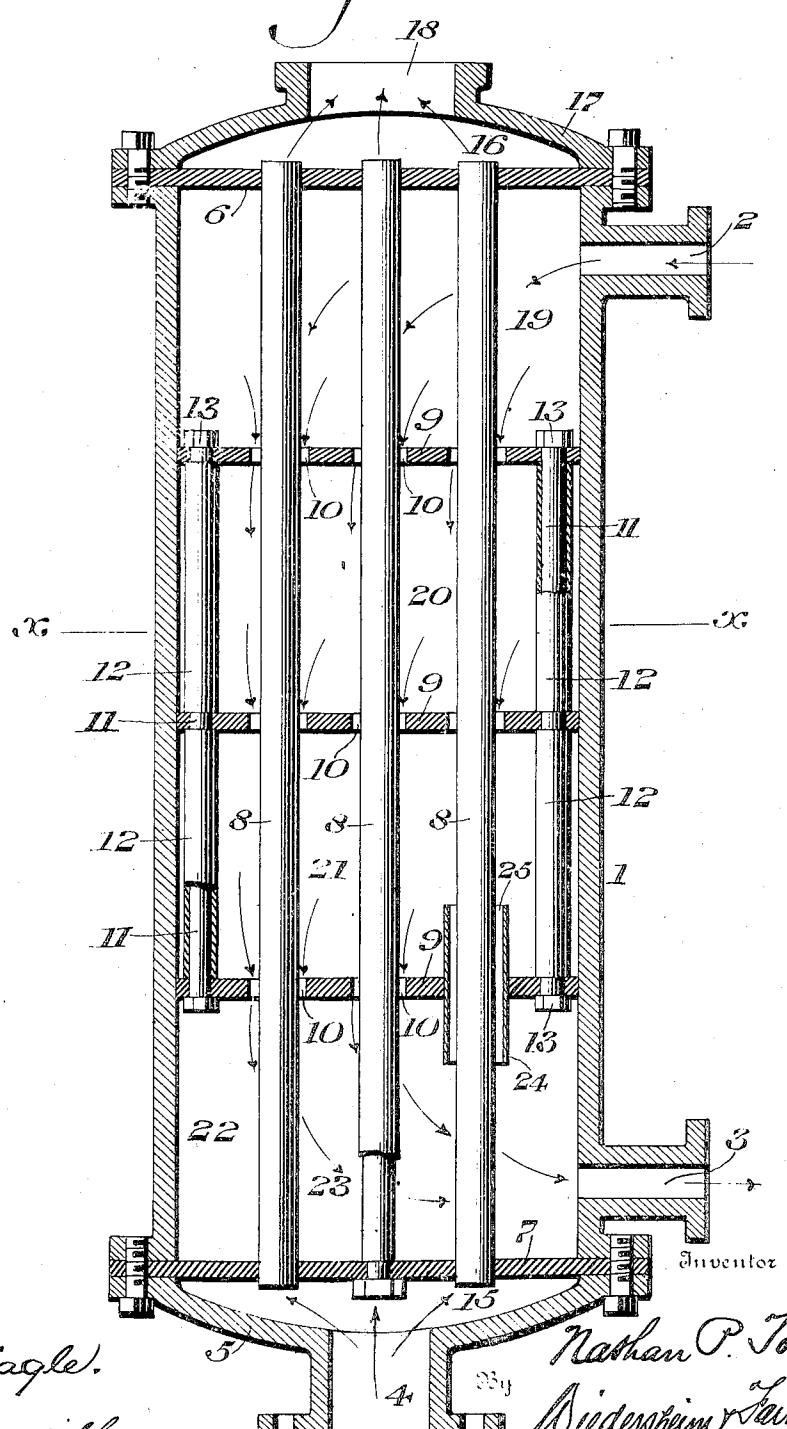
N. P. TOWNE.

CONDENSER.

APPLICATION FILED DEO. 26, 1905.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

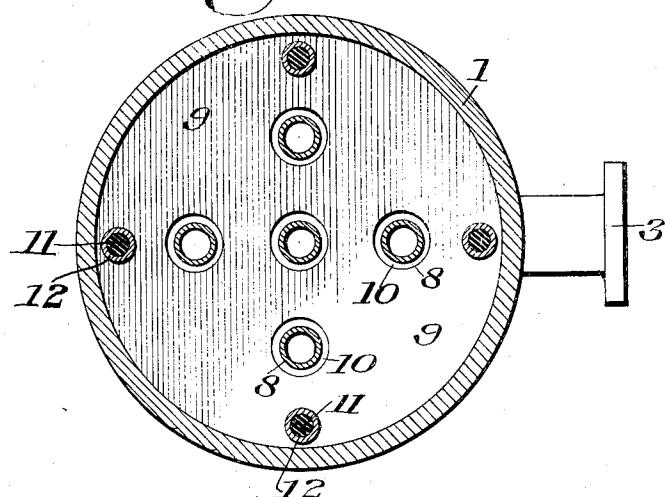
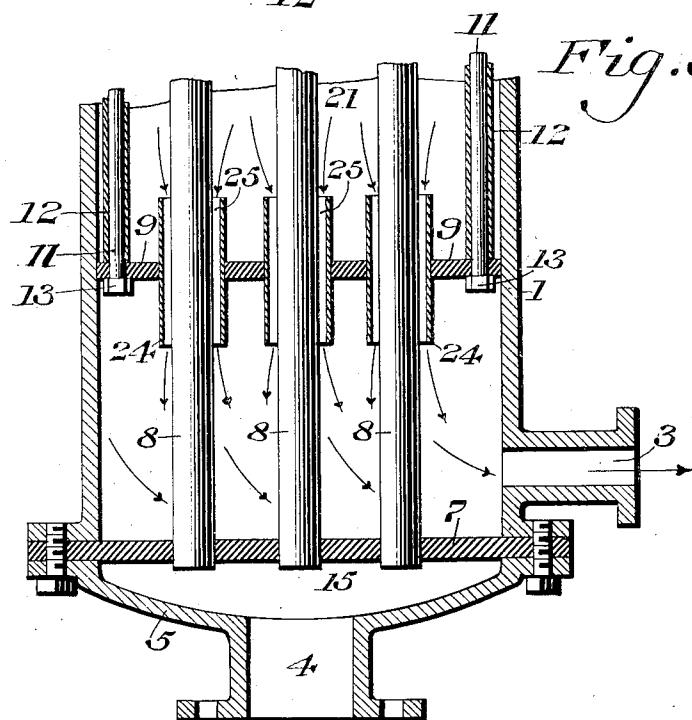


Fig. 3.



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UNITED STATES PATENT OFFICE.

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ONE-HALF TO HARRY W. HAND, OF PHILADELPHIA, PENNSYLVANIA.

CONDENSER.

No. 827,479.

Specification of Letters Patent.

Patented July 31, 1906.

Application filed December 26, 1905. Serial No. 293,285.

To all whom it may concern:

Be it known that I, NATHAN P. TOWNE, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Condenser, Distiller, and Feed-Water Heater, of which the following is a specification.

It is well known that in surface condensers, distillers, feed - water heaters, and the like it requires much more than the theoretical amount of condensing-surface to condense a certain quantity of water; and my present invention relates to a novel construction of a condenser, distiller, and feed-water heater wherein I have made provision for causing the entire volume of the entering steam to come into immediate and intimate contact with the condensing-surface to a greater extent than heretofore by the provision of a novel construction of baffle-plates or diaphragms which are apertured and assembled in a novel manner and provided with means for causing the steam to travel in close proximity to the cold-water tubes, said steam being forced to proceed in its passage from its entrance to its exit in intimate contact with the cold tubes through which the cool condensation - water is passing, whereby the steam is quickly condensed.

My invention further consists in the provision of novel means for enabling the baffle-plates or diaphragms which are employed to be readily removed from the inclosing shell or casing and to be effectively held in proper relative position to the cold-water tubes.

I am aware that it has heretofore been proposed in the patent to Hand, No. 596,874, dated January 4, 1888, to employ a series of tubes and tube-plates so arranged as to be detachable from the casing, thereby forming a removable tube structure with deflecting-plates carried by the removable tube structure; but my invention differs from the afore- said patent in the fact that I employ a different arrangement of baffle-plates or diaphragms and support the same in proximity to the water-tubes in a different manner, whereby I obtain novel and advantageous results which are not disclosed in the patent aforesaid.

It is obvious that the principal instrumentalities of which my invention consists can be variously arranged and organized, and in the

accompanying drawings I have shown one simple embodiment thereof which I have found in practice to be successful, although it is understood that my invention is not limited to this specific arrangement and organization of these instrumentalities.

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To the above ends my invention consists, broadly, of a new and useful condenser, distiller, and feed - water heater wherein the whole volume of the incoming steam is caused to come into immediate contact with the condensing-surface, provision being made for bringing said steam into immediate and intimate contact with the cold tubes through which the cold condensation-water is passing, whereby the steam is quickly condensed, and I further make provision for enabling the various parts of the apparatus to be quickly accessible for the purpose of inspection and repairs.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

Figure 1 represents a vertical sectional view, partly in elevation, of a condenser, distiller, and feed-water heater embodying my invention. Fig. 2 represents a section on line $x-x$, Fig. 1. Fig. 3 represents another embodiment of a part of my invention wherein I employ an auxiliary tube in the diaphragm-plate, whereby an elongated annular space for the passage of the steam is provided between the condensing-tubes and the outer or guide tube.

Similar numerals of reference indicate corresponding parts in the figures.

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Referring first to Figs. 1 and 2, 1 designates the outer casing or shell of my novel distiller, condenser, or feed-water heater, having the steam-inlet 2 and the steam-outlet 3, it being understood that said shell may lie in either a horizontal, vertical, or other position.

4 designates the inlet for the cooling-water, which passes thence into the chamber 15, formed between the inlet-cap 5 and the adjacent diaphragm 7, the cooling-water passing from said chamber 15 through the tubes 8 into the chamber 16, formed between the cap 17 and the tube-sheet 6, said cap 17 having the outlet 18 therein.

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9 designates the diaphragms, which I have shown in Fig. 1 as being three in number, although it is evident that their number may

be increased or diminished according to requirements, said diaphragms extending across the diameter of the shell and completely filling or closing it, except for the annular ports 5 or passages 10, formed between said tubes and diaphragms, said passages forming a communication between the different steam compartments 19, 20, 21, and 22, it being apparent that said compartments may be increased or diminished according to requirements, the lower compartment in the present instance being formed between the lower diaphragm 9 and the lower tube sheet or plate 7. The diaphragms are held in proper 15 position within the shell by the bolts 11, which pass through their outer portions and also through the spacing devices or sleeves 12, whose ends abut against the diaphragms 9, as will be understood from Fig. 1, said diaphragms, sleeves, and bolts being held in assembled position by the nuts 13, which when tightened will lock the diaphragms in position with respect to each other.

23 designates a bolt, which may be employed for tying or bracing the tube-plates 6 and 7.

It will be evident that as the steam passes into the inlet 2 it will enter the first steam-compartment 19, completely filling the same, 30 so that each of the tubes 8 will be completely surrounded and the steam will be in intimate and immediate contact with the same. The steam from the first compartment 19 will pass through the annular ports or passages 35 10 into the next steam-compartment 20 and will fill the same, and so on through each compartment in its passage through the apparatus and will finally discharge at the outlet 3. By this provision it will be seen that 40 the steam is forced to travel in its passage from the entrance to the exit through the annular passages 10 around the tubes in intimate contact with the cold tubes, through which the cool condensation-water is passing, 45 the effect being that the steam is quickly and positively condensed. In the construction shown in Fig. 3 I have shown guide-tubes 24, which are located in the diaphragms around the tubes 8, the space between the inside of 50 the larger or guide tubes 24 and the outside of the coacting condensing-tube forming elongated annular passages 25, said guide-tubes thus forming the communication between the several steam-chambers, it being 55 evident that by reason of this construction the steam is kept longer in contact with the cold tubes, since the elongated annular passages 25 cause the steam to travel for a considerable period in close and intimate contact with the water-tubes 8, whereby the desired result is obtained.

It will be seen from the foregoing that the diaphragms 9 are not permanently attached to the shell 1, but are connected to each other 60 in such a way that upon the removal of either

of the caps and the plate contiguous thereto the diaphragms and their adjuncts can be readily withdrawn for inspection or repairs.

It will be evident that various changes may be made by those skilled in the art which may come within the scope of my invention, and I do not, therefore, desire to be limited in every instance to the exact construction herein shown and described.

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

1. In a condenser, distiller or feed-water heater, an outer shell, an inlet and outlet therein for the steam, water-tubes secured within said shell and a plurality of diaphragms secured within said shell, thereby forming a plurality of steam-compartments, each of said diaphragms having ports therein through which said water-tubes pass, of greater diameter than said tubes, whereby said steam in its travel through the compartments of said shell comes into intimate contact with said tubes.

2. In a condenser, distiller or feed-water heater, a shell, water-tubes located therein, a series of diaphragms in said shell through which said tubes pass, said diaphragms having passages therein of greater diameter than said tubes, sleeves intermediate said diaphragms and bolts passing through said sleeves for holding the latter and said diaphragms in assembled position.

3. In a condenser, distiller or feed-water heater, a shell having water-tubes therein, a diaphragm through which said tubes freely pass and a guide-tube in said diaphragm extending above and below the latter, whereby the steam in passing through said guide-tube is brought into intimate and immediate contact with the adjacent water-tube.

4. In a condenser, distiller or feed-water heater, a shell, a series of water-tubes supported therein, diaphragms extending transversely of said shell so as to form steam-compartments therein, said diaphragms having passages therein of greater diameter than said tubes through which said tubes pass, and guide-tubes located in said passages and extending above and below said diaphragms, whereby the steam is caused to travel in intimate and immediate contact with said water-tubes in its passage through said compartments.

5. In a condenser, distiller or feed-water heater, a shell having water-chambers 15 and 16 at its ends, an inlet and outlet 2 and 3 for the steam, tube-plates 6 and 7, water-tubes having their ends secured in said tube-plates, a plurality of diaphragms 9, having ports 10 therein through which said water-tubes pass, sleeves 12 intermediate said diaphragms and bolts 11 passing through said sleeves and diaphragms for holding the latter in assembled position.

6. In a condenser, distiller or feed-water heater, a shell having water-chambers 15 and 16 at its ends, an inlet and outlet 2 and 3 for the steam, tube-plates 6 and 7, water-tubes having their ends secured in said tube-plates, a plurality of diaphragms 9, having ports 10 therein through which said water-tubes pass, sleeves 12 intermediate said diaphragms and bolts 11 passing through said sleeves and dia-

phragms for holding the latter in assembled 10 position, in combination with a guide-tube secured in said diaphragms in said ports 10, whereby a steam-passage 25 is formed extending above and below said diaphragms.

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