Aug. 18, 1925 1,550,368

J. F. KIRGAN

SURFACE CONDENSER

Original Filed April 6, 1923

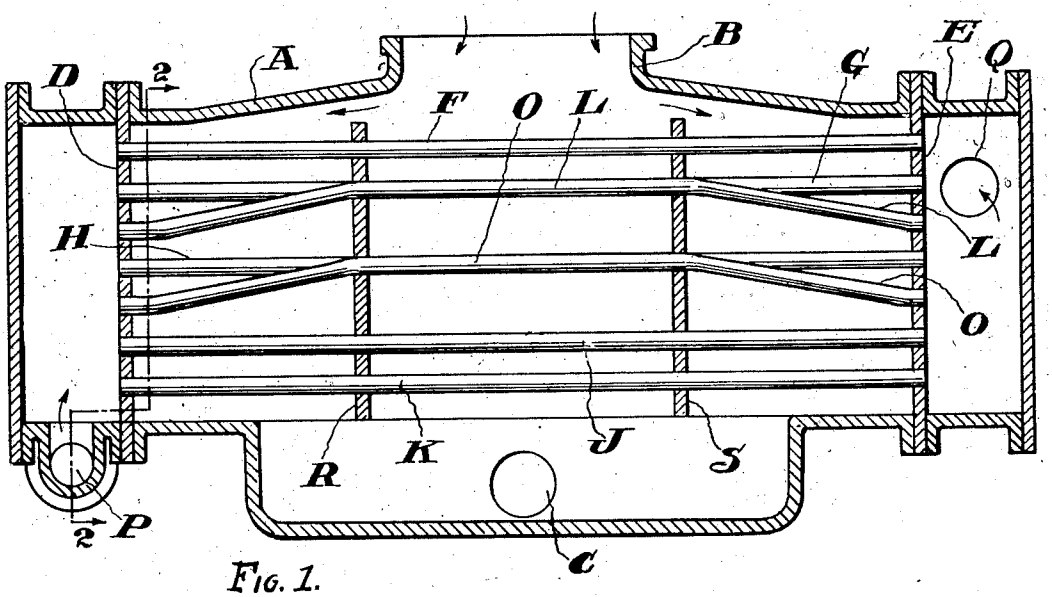


FIG. 1.

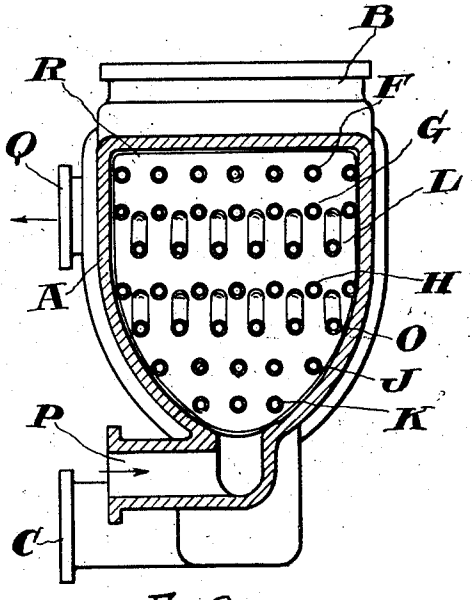


FIG. 2.

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UNITED STATES PATENT OFFICE.

JOHN F. KIRGAN, OF PHILLIPSBURG, NEW JERSEY, ASSIGNOR TO INGERSOLL-RAND COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

SURFACE CONDENSER.

Application filed April 6, 1923, Serial No. 630,224. Renewed March 20, 1925.

To all whom it may concern:

Be it known that I, JOHN F. KIRGAN, a citizen of the United States, a resident of Phillipsburg, county of Warren, and State of New Jersey, have invented a certain Surface Condenser, of which the following is a specification accompanied by drawings.

This invention relates to surface condensers having cooling elements in the form of rows of tubes, and the objects of the invention are to increase the efficiency of such condensers by causing more steam to pass to the ends of the condenser casing. This I accomplish by reducing the area for the passage of steam between the tubes in one or more rows and increasing the frictional resistance to the passage of the steam, in a simple and cheap manner, without the use of baffles or increasing the number of tubes or changing the spacing of the usual tubes in the tube sheets.

The invention is shown in one of its preferred forms in the accompanying drawings, in which

Figure 1 is a longitudinal sectional elevation of a condenser, and

Figure 2 is a transverse sectional view on the line 2—2 of Figure 1, looking in the direction of the arrows.

Referring to the drawings, the condenser comprises the casing A having the steam inlet B and the outlet C for condensate. The casing is provided with the usual tube sheets D and E in which rows of straight tubes F, G, H, J and K are shown. The tubes L and O in any desired alternate rows as shown are off-set or bent, in this instance, upwardly so that portions of their length lie in substantially the same plane as the straight tubes G and H respectively of adjacent rows. The tubes L and O are preferable off-set or bent for the major portion of their length and are preferably bent upwardly into substantially the same planes as the rows of tubes directly above them, so that drainage of the off-set tubes is facilitated. Although the off-set tubes L and O are shown in a region above the mid section of the condenser, they could be at the top or bottom as desired.

The cooling water passes through the tubes from the inlet P to the outlet Q in the usual manner. Supporting members R and S are suitably spaced within the condenser, and in accordance with the construction described, the area for the passage of steam between the tubes G and L, and H and O in the combined rows, is reduced and the frictional resistance is increased, so that some of the steam is directed towards the ends of the condenser casing and passes over the supporting members R and S to points at which there is greater area for the passage of steam and less frictional resistance. In this way, the efficiency of the condenser is increased and a more even distribution of steam throughout the condenser casing produced.

I claim:

1. A surface condenser, comprising a casing and tube sheets, cooling elements in the form of rows of straight tubes held in said tube sheets, the tubes in at least one row being off-set so that portions of their length lie in substantially the same plane as an adjacent row of straight tubes, whereby greater frictional resistance is afforded to the passage of the steam and some of the steam is directed towards the ends of the condenser casing.

2. A surface condenser, comprising a casing and tube sheets, cooling elements in the form of rows of straight tubes held in said tube sheets, the tubes in a plurality of alternate rows being off-set along the major portions of their length, so that the off-set portions lie in substantially the same planes as the straight tubes of adjacent rows respectively, whereby the area for the passage of steam between the tubes in said combined rows is reduced and the frictional resistance is increased in order to direct more of the steam towards the ends of the condenser casing.

In testimony whereof I have signed this specification.

JOHN F. KIRGAN.