July 1, 1930. C. L. A. M. LEBLANC 1,769,743

AUXILIARY CONDENSER FOR TWO-STAGE AIR EJECTORS

Filed June 8, 1923 3 Sheets-Sheet 1

FIG. 4

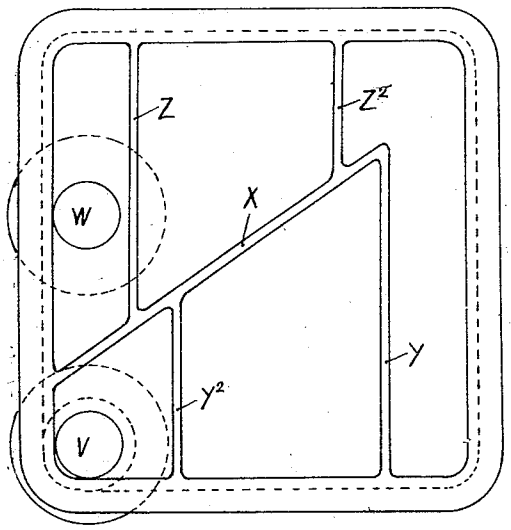



FIG. 5

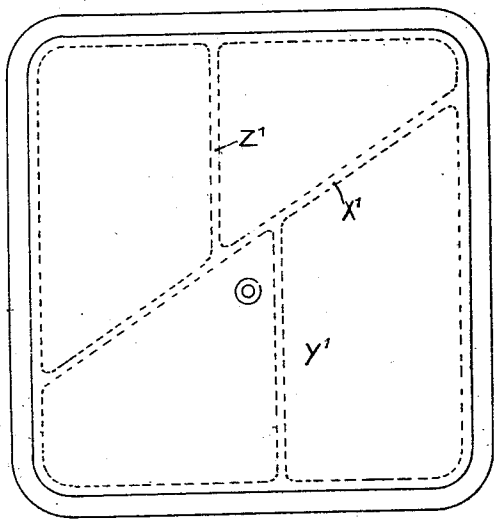
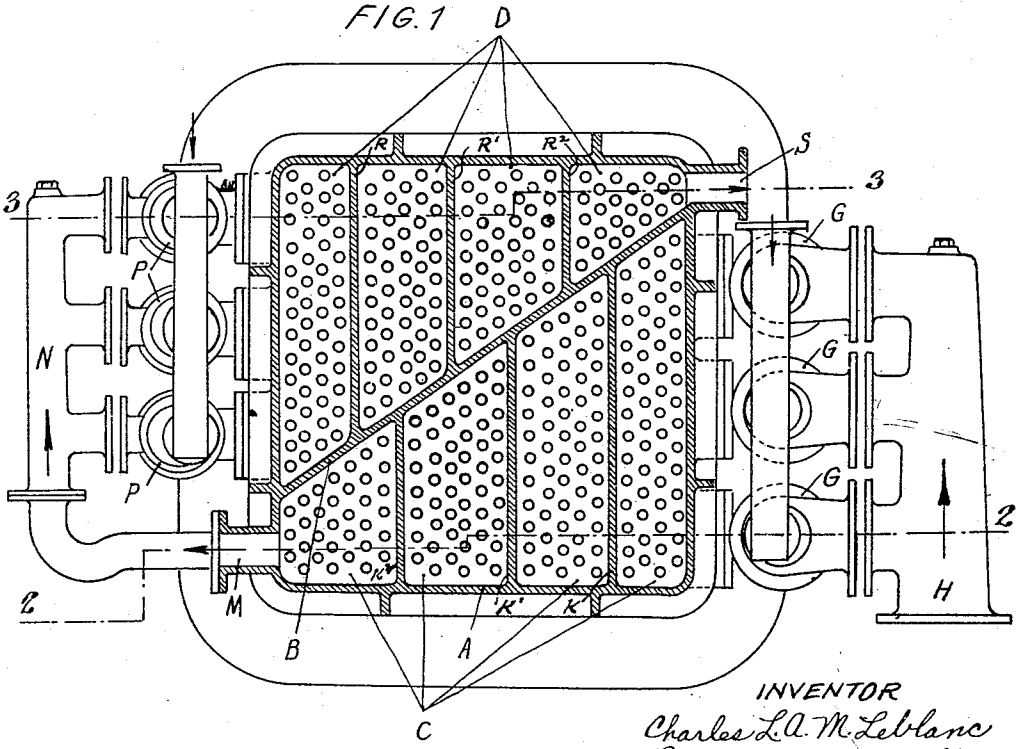



FIG. 1



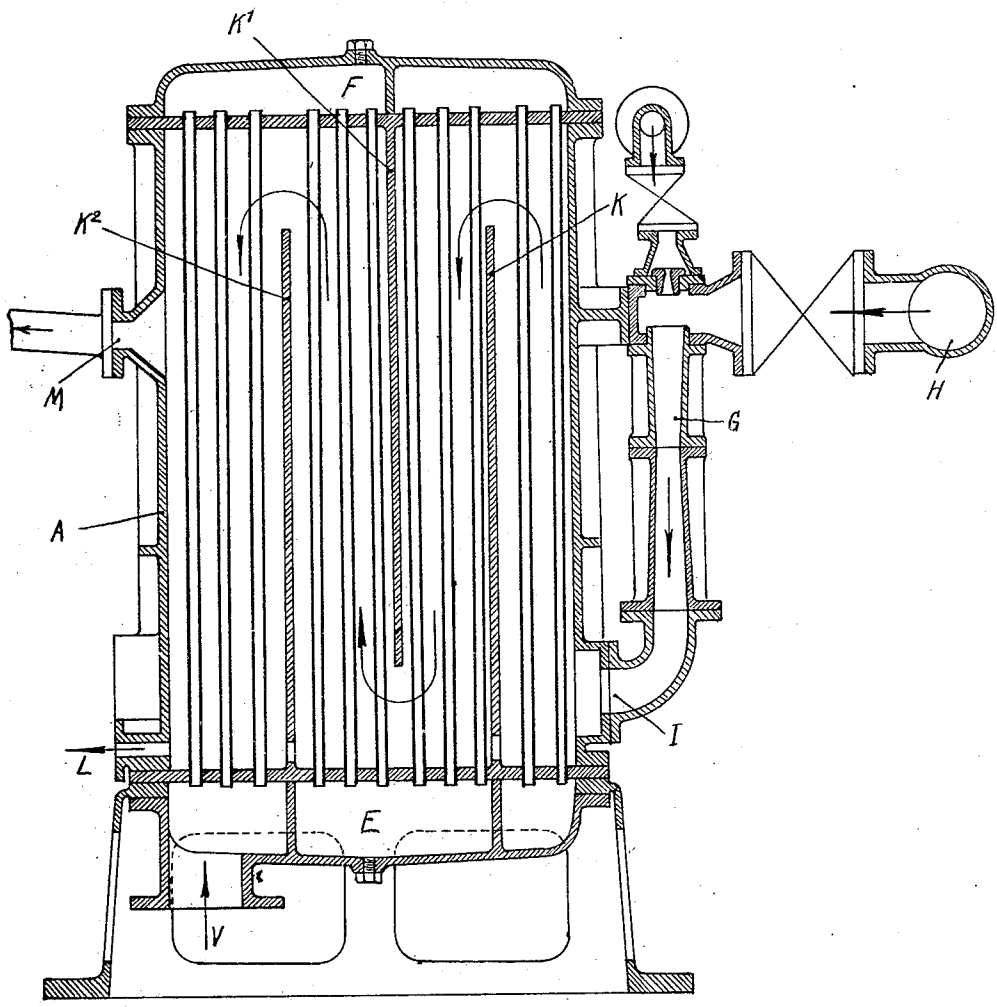

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AUXILIARY CONDENSER FOR TWO-STAGE AIR EJECTORS

Filed June 8, 1923 3 Sheets-Sheet 2

FIG. 2



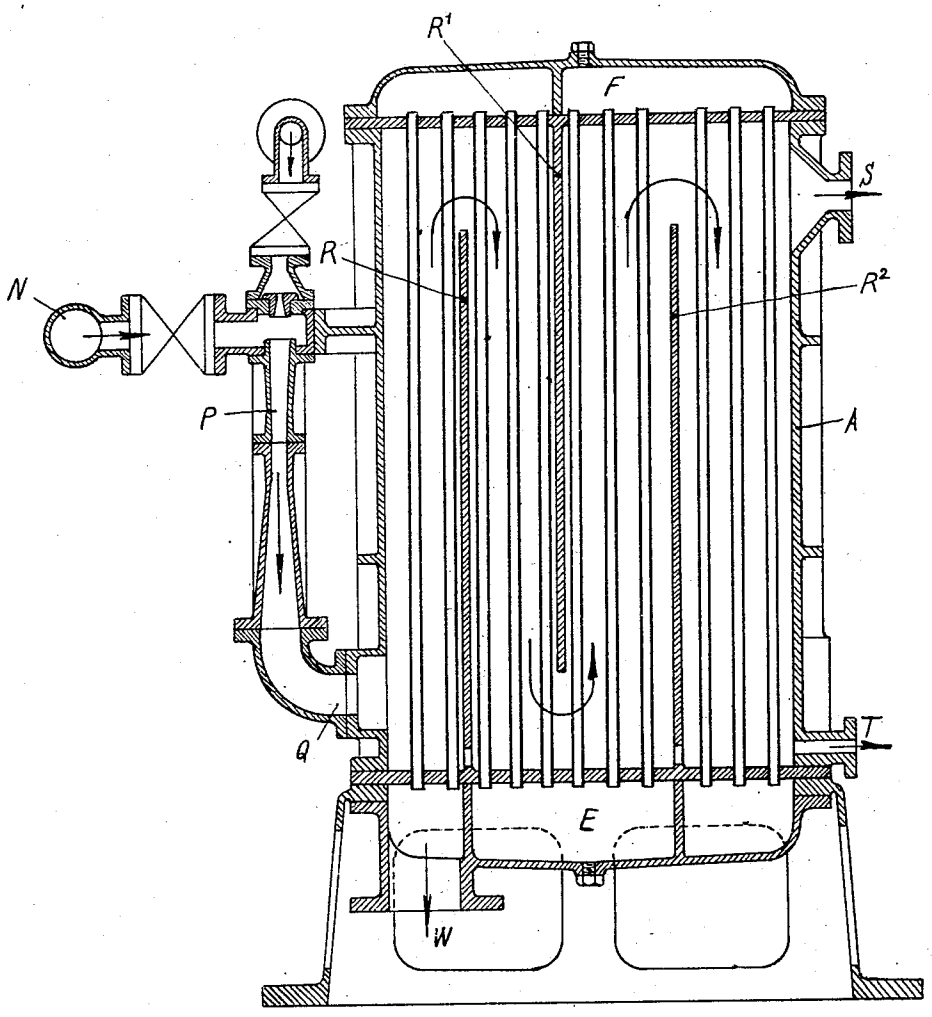

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AUXILIARY CONDENSER FOR TWO-STAGE AIR EJECTORS

Filed June 8, 1923 3 Sheets-Sheet 3

FIG. 3




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# UNITED STATES PATENT OFFICE

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## AUXILIARY CONDENSER FOR TWO-STAGE AIR EJECTORS

Application filed June 8, 1923, Serial No. 644,134, and in France March 22, 1923.

The U. S. patent application filed September 19, 1922, Serial No. 589,177, now Patent No. 1,569,760, describes an air extracting apparatus for condensers of steam engines; this apparatus comprises two stages of steam ejectors interconnected in series, each stage comprising several ejectors mounted in parallel.

Every one of these stages ends or opens into an auxiliary surface condenser which condenses the steam issuing from these ejectors; the cooling water which circulates within the tubes of the auxiliary condensers is condensate from the main condenser. This water traverses in series the two auxiliary condensers, first the first stage one, then, the second stage one, so as to rationally recover the heat of condensation of the steam of these ejectors.

An object of the present invention is to provide a construction of intermediate condensers grouping these two parts in the same casing showing sizes which are as reduced as possible and permitting a methodical circulation of the cooling water, on the one hand, and of the vapours to be condensed, on the other one, thereby insuring the utmost efficiency of the cooling surfaces.

For this purpose, the separate tube nests of each one of these two condensers are arranged within the casing having a parallelepiped form and, parallel to the sides of the latter, the inside portion of this casing being divided by means of a longitudinal partition into two prismatic chambers of triangular section which, respectively, constitute the steam chambers of the two condensers.

The circulation and condensation of steam and the circulation of the cooling water take place in the way which will be hereinafter described.

Figure 1 is an horizontal section of the double condenser which forms the subject-matter of the present invention.

Figure 2 is a vertical section of the apparatus illustrated in Fig. 1 taken on the line 2—2 of Fig. 1.

Figure 3 is a similar view taken on the line 3—3 of Fig. 1.

Figure 4 is a plan view of the bottom of the double condenser, and

Figure 5 is a plan view of the top.

The parallelepiped casing A common to the two condensers is arranged vertically for example, the diagonal partition B dividing the same into two steam chambers C and D, of triangular section. In each one of these chambers is located a vertical tube nest the tubes of which open as usual, through two perforated plates, into the water chambers E, F, arranged the one at the lower part and the other, at the upper part of the double condenser and which constitute the top and bottom of the latter.

The first stage ejectors G (Figure 2) suck air from the main condenser through the common pipe H; the steam issuing from these ejectors passes through the ports I into the bottom of the chamber C which forms the first intermediate condenser.

It traverses this chamber as indicated by the arrows on Figure 2, screens K, $K^1$, $K^2$, arranged as baffles in the chamber C causing the same to go up or down along the condensation tubes, thereby extending the travel thereof in contact with said tubes; at same time, the circulation of water through the tubes is regulated so that it will always take place in a reverse direction to that of the vertical circulation of steam; this result is obtained by means of partitions, provided as hereinafter described in the water chambers E, F, by the extension of the partition B and baffles K, $K^1$, $K^2$ into the water chambers.

The water condensed in the chamber C is drawn off at L; the non-condensed products are led through the orifice M to the pipe

N from which they are sucked or drawn by the ejectors of the second stage P.

It will be observed that between the inlet I and the outlet M the cross sectional area of the current of steam, by virtue of the triangular form of the chamber, is constantly decreasing, and the construction is such as to provide a condensing chamber the size of which is reduced in accordance with the reduction in the weight and volume of steam in proportion as the latter in progressing is cooled and condensed.

The second stage ejectors P open into the lower part of the chamber D through ports Q. As previously, the steam to be condensed is moved into a chamber the cross section of which decreases from the inlet to the outlet. Vertical screens or baffle-plates R, $R^1$, $R^2$, force the steam to circulate vertically along the tubes and in a reverse direction to that of the cooling water within the latter.

The air escapes into the atmosphere through the orifice S provided at the upper part of the chamber D, in the coolest section.

The condensate in chamber D is drawn off at T.

The cooling water enters at V into the lower water chamber E, on the opposite side to the steam inlet into the chamber C; the water chamber E is divided by means of partitions X, $Y^2$, Y, $Z^2$, Z respectively arranged, as shown in Figure 4, in the extension of the diagonal partition or wall B which separates the two condensers and of the screens $K^2$, K and $R^2$, R.

The water then ascends in the nest of tubes between the walls of the chamber C and reaches the upper water chamber F; the latter is, as shown in Figure 5, divided by partitions $X^1$, $Y^1$, $Z^1$ respectively arranged in the extension of the diagonal partion B of the screens $K^1$, $R^1$. This set of partitions causes the water to flow down again, then up again in the tubes of chamber C, then in those of the chamber D, always, in a reverse direction to that of the current of steam; the coldest water is thus always in contact through the tubes with the coldest steam, as well in the condenser C as in the condenser D and it finally flows out at W.

What I claim is:

1. A condenser having a partition extending diagonally therethrough so as to provide separate condenser chambers of triangular cross section forming successive condenser stages, an inlet and outlet for each chamber, baffles in each chamber cooperating with said diagonal partition for forming a passage of continuously reduced cross section between each inlet and outlet and means connecting said condenser stages in series.

2. A two-stage condenser comprising a casing substantially rectangular in transverse section and having a partition therein lying substantially along a diagonal of the rectangle defined by said section, a plurality of groups of tubes located on each side of said partition and extending longitudinally of said condenser, baffles between said groups of tubes and a plurality of inlets for admitting fluid to be condensed to each side of said diagonal partition.

In testimony whereof I have signed this specification.

CHARLES LEONARD ARMAND MAURICE LEBLANC.