O. H. MUELLER.

COUNTER CURRENT CONDENSER.

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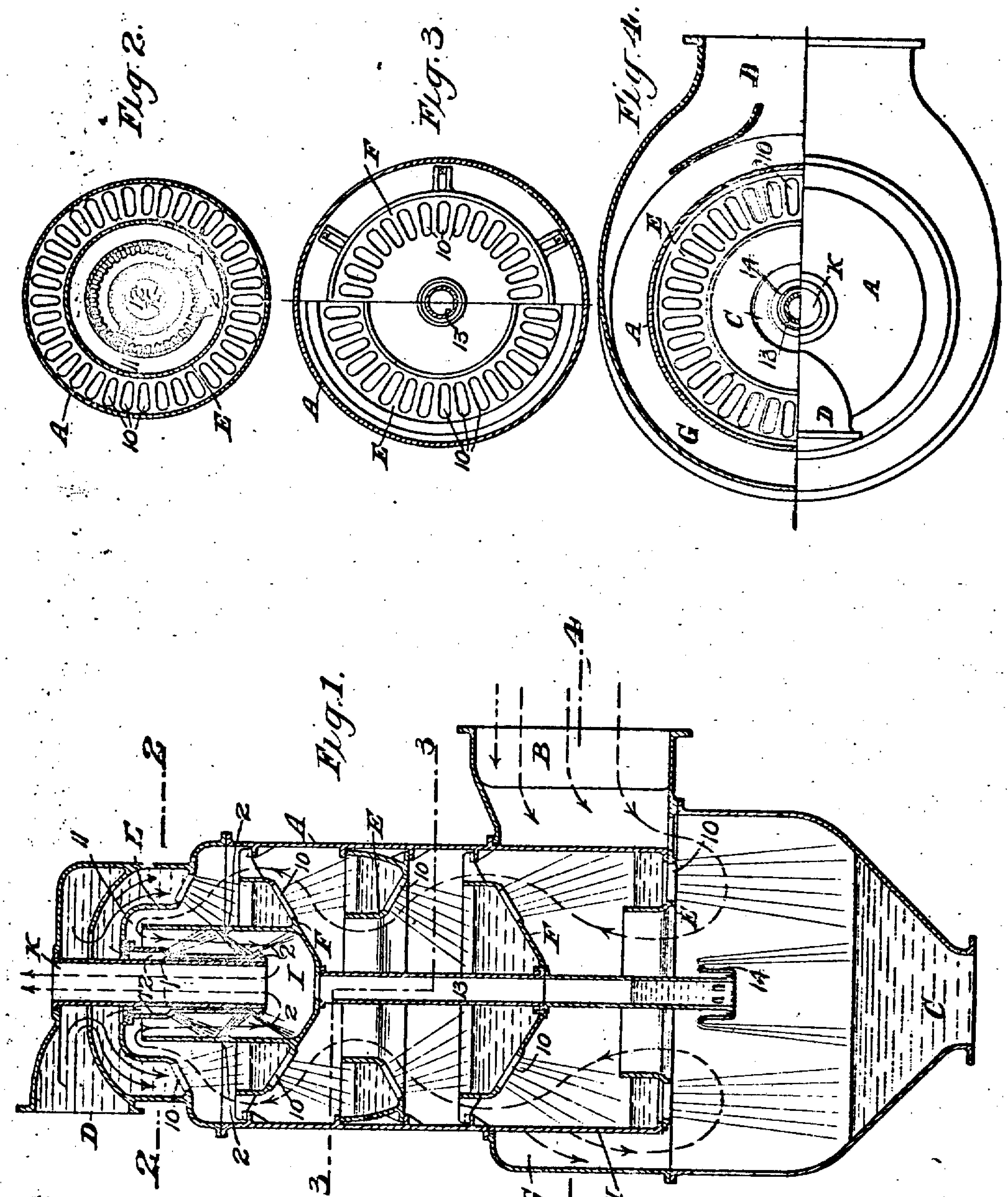
899,063.

Patented Sept. 22, 1908.



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UNITED STATES PATENT OFFICE.

OTTO HILDEBERT MUELLER, OF CAMBERWELL, ENGLAND, ASSIGNOR TO HENRY R. WORTHINGTON, A CORPORATION OF NEW JERSEY.

COUNTER-CURRENT CONDENSER.

No. 899,063. Specification of Letters Patent. Patented Sept. 22, 1908.

Application filed December 18, 1907 Serial No. 406,983.

To all whom it may concern:

Be it known that I, OTTO HILDEBERT MUELLER, a subject of the German Emperor, residing at 73 Lydenham Hill, Camberwell, county of Kent, England, have invented certain new and useful Improvements in Counter-Current Condensers, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to jet condensers of that class known as counter current condensers, the object of the invention being to provide an improved condenser that shall secure an efficient condensation and high vacuum with a small amount of condensing water and avoid reversal of the current, and further to provide an improved construction for taking off and cooling the air.

For a full understanding of the invention, a detailed description of a condenser embodying all the features of the same in their preferred form will now be given in connection with the accompanying drawing forming a part of this specification, and the features forming the invention then specifically pointed out in the claims.

In the drawings—Figure 1 is a vertical central section of the condenser. Figs. 2, 3 and 4 are cross sections of the same on respectively the lines 2, 3 and 4 of Fig. 1.

Referring to the drawings, A is the condenser shell, B the exhaust steam inlet, C the discharge outlet, D the injection or condensing water inlet and E a series of outer trays alternating with a series of inner trays F through which the condensing water passes downward from the inlet D at the top of the condenser to the outlet C at the bottom of the condenser. These trays E, F, have their bottoms provided with elongated openings 10 through which the water falls in elongated jets from one tray to the next through the series, the outer trays E being inclined so that the jets are thrown inward into the inner trays F, and the inner trays F being inclined outward so that the jets are thrown outward into the outer trays, and space is left between the inner and outer trays and between the inner trays and the casing A for the flow of the steam and air upward through the condenser and between the oval water jets in a zig-zag path, as shown by the arrows in Fig. 1. The exhaust inlet B opens into a steam chamber G surrounding a sleeve H open at the bottom within the bottom tray E, the steam chamber G being closed at the top, so that the exhaust steam passes downward around the bottom of the sleeve H and through the lowest water jets to reach the interior of the condensing chamber, the steam thus being properly distributed to the condensing chamber, and partially condensed by the lowest jets.

The air cooler consists of a chamber I in the upper part of the condenser having upwardly extending pipe K to which the air pump is connected, the air entering this chamber I at the top through passage 11, formed between the inner portion of the top tray E and the open top of the chamber I, the condensing water entering a sleeve 12 inclosing the pipe K so as to cool the latter and being thrown into the chamber I from openings 1 in the sleeve 12 and deflected from surfaces 2 on the chamber and sleeve so as to provide a series of jets by which the air is cooled and any uncondensed steam condensed. The discharge water from the chamber I passes downward through drain pipe 13 arranged centrally of the condenser, this pipe being sealed at its lower end by water vessel 14 carried by the lower end of the pipe, so that no steam from the lower part of the condenser can pass direct to the air cooler, and by the long discharge pipe a considerable difference of pressures can be set up without interfering with the proper drainage of the air cooler.

The operation of the condenser is as follows:—A flow of condensing water having been established, the steam entering at B is distributed around the sleeve G in the chamber H, and passes downward around the lower end of the sleeve and through the water jets from the lowest tray E into the central opening inclosed by the tray and then upward between the successive water jets in the path shown by the arrows, to the top of the condenser. Any air and uncondensed vapor, after passing through the jets from the top tray E, passes inward and downward around the open top of the chamber I through the air cooler water jets, completing the condensation of the vapor, and the air is then drawn off through the pipe K, being cooled further by the walls of this pipe inclosed by the cold condensing water. The drainage from the air cooler passes down

through the pipe 13 and its water sealed lower end to the condenser discharge C.

It will be understood that the invention is not limited to the exact form or arrangement of the devices shown, but that various modifications may be made therein without departing from the invention as defined by the claims.

What is claimed is:—

1. A counter current condenser having a water inlet above the condensing chamber, a series of inner and outer trays provided with openings forming water jets between which the steam passes, a steam inlet in the lower part of the condenser, and a steam distributing sleeve opposite the steam inlet forming a steam inlet chamber surrounding the condensing chamber and open at the bottom to the condensing chamber.

2. A counter current condenser having a water inlet above the condensing chamber, a series of inner and outer trays provided with elongated openings forming narrow water jets between which the steam passes, a steam inlet in the lower part of the condenser, a steam distributing sleeve opposite the steam inlet forming a steam inlet chamber surrounding the condensing chamber and open at the bottom to the condensing chamber, the bottom water tray being placed at the lower end of the sleeve and inclosing the opening through which the steam passes upward to the condensing chamber.

3. A counter current condenser having a water inlet at the top and a steam inlet at the bottom, a series of water trays provided with openings to form water jets between which the steam passes upward, an air cooler and supplementary condenser at the top of the condensing chamber, and a drain pipe for the air cooler extending downward through the condensing chamber.

4. A counter current condenser having a water inlet at the top and a steam inlet at the bottom, a series of water trays provided with openings to form water jets between which the steam passes upward, an air cooler and supplementary condenser at the top of the condensing chamber, connections for spraying condensing water into said cooler, and a drain pipe for the air cooler extending downward through the condensing chamber and water sealed at its lower end.

5. A counter current condenser having in its upper part a chamber receiving the air and uncondensed steam and cooled by the condensing water, an air delivery pipe from said chamber, and a water discharge pipe from said chamber extending downward through the condensing chamber and water sealed at its lower end.

6. A counter current condenser having a series of outer and inner trays E, F, having their bottoms inclined and provided with openings elongated radially of the condenser to provide narrow water jets between the trays.

7. A counter current condenser having in the upper part of the condenser the chamber I open at the top to receive the air and uncondensed vapor, sleeve 12, inclosing said chamber, and connections for supplying condensing water to said sleeve.

8. A counter current condenser having in the upper part of the condenser the chamber I open at the top to receive the air and uncondensed vapor, sleeve 12, inclosing said chamber, connections for supplying condensing water to said sleeve, and openings 1 and surfaces 2 for spraying water into said chambers.

9. A counter current condenser having in the upper part of the condenser the chamber I open at the top to receive the air and uncondensed vapor, air pipe K from said chamber, and drain pipe 13 from said chamber extending downward through the condensing chamber and water sealed at its lower end.

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

OTTO HILDEBERT MUELLER.

Witnesses:
H. D. JAMESON,
F. L. RAND.