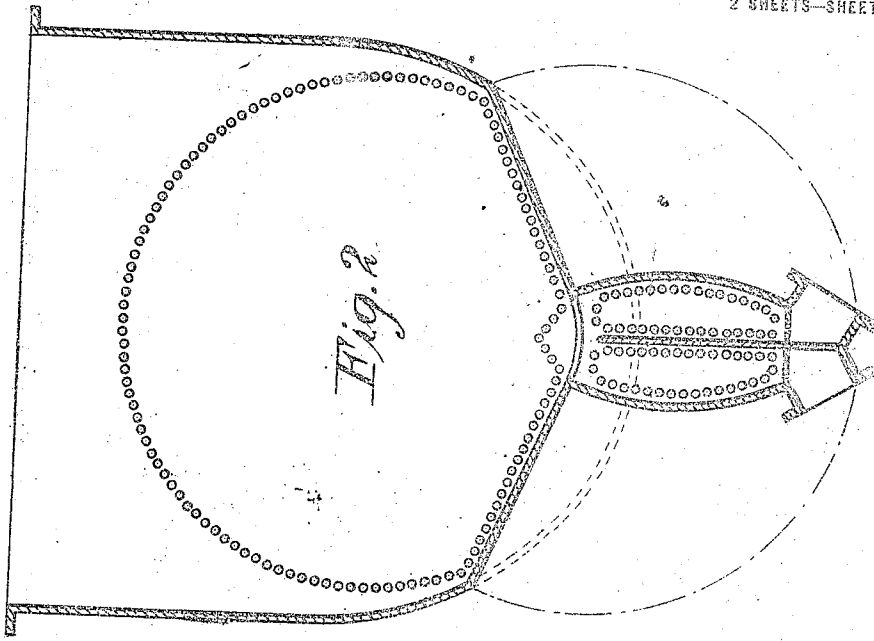
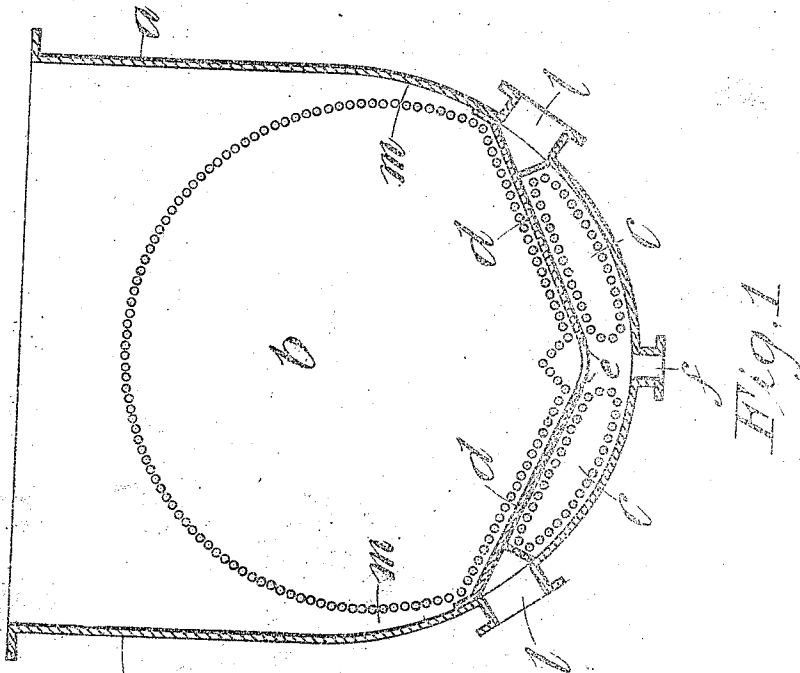


D. B. MORISON.
STEAM CONDENSER.
APPLICATION FILED OCT. 17, 1914.

1,153,814.

Patented Sept. 14, 1915.
2 SHEETS—SHEET 1.



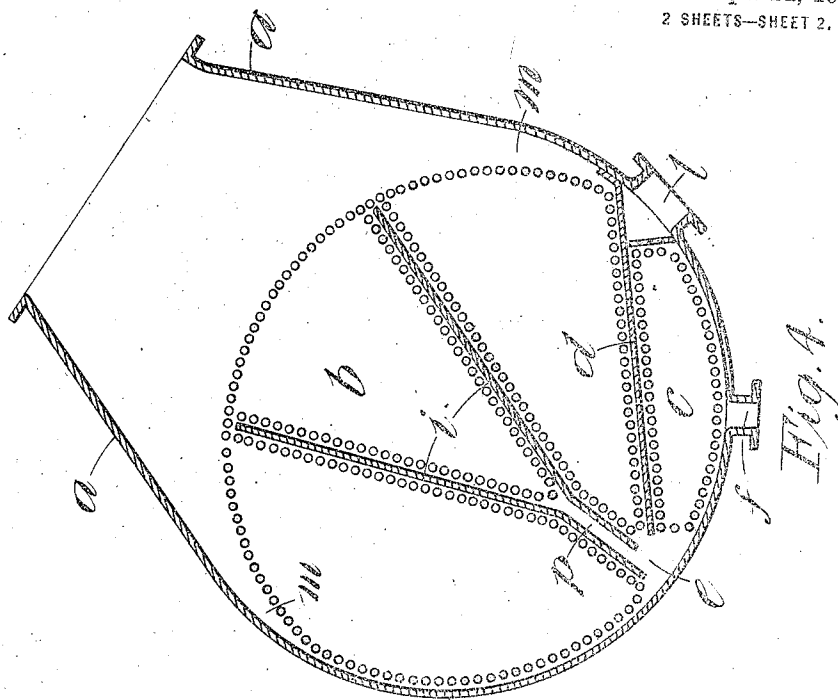
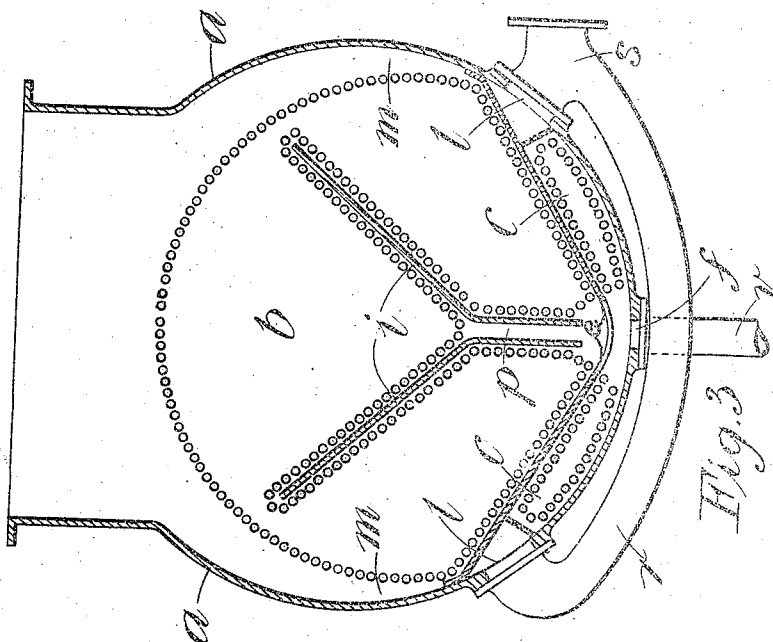
Attest:
E. A. Tolson
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Inventor:
Donald Barnes Morison
Spec. Machine, D. B. Morison, 1915

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Attest:

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UNITED STATES PATENT OFFICE.

DONALD BARNES MORISON, OF HARTLEPOOL, ENGLAND.

STEAM-CONDENSER.

1,153,814.

Specification of Letters Patent. Patented Sept. 14, 1915.

Application filed October 17, 1914. Serial No. 867,224.

To all whom it may concern:

Be it known that I, DONALD BARNES MORISON, a subject of the King of Great Britain and Ireland, residing at Hartlepool, in the county of Durham, England, have invented Improvements in Steam-Condensers, of which the following is a specification.

This invention relates to improvements in steam condensers of the tubular surface type.

The object of the invention is to increase the efficiency of a steam condenser by a construction or arrangement of parts whereby the mean length of the lines of steam flow over the condensing surface is shortened in a given condenser in which the direction of the lines of steam flow is wholly substantially downward.

In a condenser in which an air receiving or outlet chamber is situated in the base of the condenser and divided from the steam condensing chamber by a plate having a port or ports for the passage of aerated vapor from the steam condensing chamber into the air receiving or outlet chamber, in the manner described in my Letters Patent No. 979540 of 1910; the exhaust steam admission space between the shell of the condenser and the tubes is, according to my invention, carried down at one or both sides of the condenser so as to provide an uninterrupted space for the flow of steam to or near to the plate which separates the air receiving or outlet chamber from the condensing chamber, the width of such plate between the steam space and the port or ports being sufficient to prevent the short circuiting of the steam from the steam space into the air receiving or outlet chamber, and when the condensing chamber is divided by air concentrating guide plates into multiple condensing chambers arranged in parallel, the lower extremity of each guide terminates at or near the outlet port or ports at the base of the condensing chamber, whereby a natural flow of steam in a downward or substantially downward direction is produced, and a confused upward flow of steam and air is prevented; and with the object of equalizing the lengths of the paths of steam flow over the condensing surface in such multiple chambers, the central chamber or chambers may be shortened so as to discharge into a downwardly extending passage, the sides of which terminate at the outlet port or ports and form the sides of the adjacent chambers.

The accompanying drawings Figures 1, 3

and 4 illustrate various constructions according to the present invention, the same letters of reference being used to denote the similar parts in the several drawings.

In Fig. 1, the shell *a* of the condenser contains an air receiving chamber *c* which is separated from the condensing chamber *b* by the plate *d* that extends across the shell to the shell. The exhaust steam admission space *m* between the shell of the condenser and tubes, extends downwardly to the junction of the plate *d* with the shell *a*, such a distance being provided between the steam space *m* and the outlet port or ports *e* as will prevent prejudicial short circuiting of the steam into the air receiving chamber *c*. As shown in the drawing, the receiving chamber *c* contains tubes for the condensation of vapor and the cooling of the air, the air being withdrawn through the outlets *l* and the condensate removed through the branch *f*.

In Fig. 2, which is an expanded reproduction of Fig. 1, the air chamber is projected downward in order to show the shortened path of the lines of flow through the condensing chamber in which the volume of vapor is a maximum, and the relative lengthened path of flow in the air receiving chamber in which the volume of vapor is a minimum. It will of course be understood that the figure does not represent an actual construction, but shows the effect obtained by my invention.

In Fig. 3, the steam condensing chamber *b* is divided by air concentrating guide plates *i* into multiple V shaped chambers arranged in parallel, and with the object of equalizing the lengths of the paths of flow through the chambers, the central chamber is shortened and discharges into a downward extending passage *p*, the sides of which form in part the sides of the adjacent chambers. Condensate is removed from the condenser through the pipe *V* and air is withdrawn through the branch *s*, the air outlets *l* being connected to a common suction pipe *r*.

Fig. 4, is a modification of the arrangement shown in Fig. 3, and illustrates the application of my invention to a condenser having an exhaust steam inlet at the side.

What I claim is:—

1. Steam condensing apparatus comprising a shell containing a steam condensing chamber provided with condensing tubes, an air receiving chamber in the base of said

shell and separated from said condensing chamber by a plate, said plate extending across the condenser to the shell, a steam admission space between the shell and the tubes, said space extending without interruption from the exhaust steam inlet substantially to said plate, and an outlet port or ports from the lowermost portion of said condensing chamber into said air receiving chamber, substantially as described and for the purpose herein set forth.

2. Steam condensing apparatus comprising a shell containing a steam condensing chamber provided with condensing tubes, an air receiving chamber in the base of said shell and separated from said condensing chamber by a plate, said plate extending across the condenser to the shell, a steam admission space between the shell and the tubes, said space extending without interruption from the exhaust steam inlet substantially to said plate, an outlet port or ports from the lowermost portion of said condensing chamber into said air receiving chamber, and a plurality of guide plates arranged to divide the cross section of said steam condensing chamber into a plurality of condensing chambers arranged in parallel, the central steam condensing chamber discharging into a downwardly extending passage, the sides of said passage forming in part the sides of the adjacent condensing chambers, substantially as described and for the purpose herein set forth.

3. Steam condensing apparatus comprising a shell containing a steam condensing chamber provided with condensing tubes, an air receiving chamber in the base of said shell and separated from said condensing chamber by a plate, said plate extending across the condenser to the shell, a steam admission space between the shell and the tubes, said space extending without interruption from the exhaust steam inlet substantially to said plate, an outlet port or ports from the lowermost portion of said condensing chamber into said air receiving chamber and separate outlets from said air receiving chamber for condensate and air, substantially as described and for the purpose herein set forth.

4. Steam condensing apparatus comprising a shell containing a steam condensing chamber provided with condensing tubes, an air receiving chamber in the base of said shell and separated from said condensing chamber by a plate, said plate extending across the condenser to the shell, a steam admission space between the shell and the tubes, said space extending without interruption from the exhaust steam inlet substantially to said plate, an outlet port or ports from the lowermost portion of said condensing chamber into said air receiving chamber, an air outlet at each side of the condenser from the

air receiving chamber, and an outlet for condensate at the base of the condenser.

5. Steam condensing apparatus comprising a shell containing a steam condensing chamber provided with condensing tubes, an air receiving chamber in the base of said shell and separated from said condensing chamber by a plate which extends upwardly, the upper extremities joining the shell of the condenser at the sides, a steam admission space between the shell and the tubes, said space extending without interruption from the exhaust steam inlet to the upper extremities of said plate, the lower portion of said plate terminating at the outlet port or ports from the lowermost portion of said condensing chamber into said air receiving chamber, substantially as described and for the purpose herein set forth.

6. Steam condensing apparatus comprising a shell containing a steam condensing chamber provided with condensing tubes, an air receiving chamber in the base of said shell and separated from said condensing chamber by a plate which extends upwardly, the upper extremities joining the shell of the condenser at the sides, a steam admission space between the shell and the tubes, said space extending without interruption from the exhaust steam inlet to the upper extremities of said plate, the lower portion of said plate terminating at the outlet port or ports from the lowermost portion of said condensing chamber into said air receiving chamber, and a plurality of guide plates arranged to divide the cross section of said steam condensing chamber into a plurality of condensing chambers arranged in parallel, the central steam condensing chamber discharging into a downwardly extending passage, the sides of said passage forming in part the sides of the adjacent condensing chambers, substantially as described and for the purpose herein set forth.

7. Steam condensing apparatus comprising a shell containing a steam condensing chamber provided with condensing tubes, an air receiving chamber provided with condensing tubes in the base of said shell and separated from said condensing chamber by a plate which extends upwardly, the upper extremities joining the shell of the condenser at the sides, a steam admission space between the shell and the tubes, said space extending without interruption from the exhaust inlet to the upper extremities of said plate, the lower portion of said plate terminating at the outlet port or ports from the lowermost portion of said condensing chamber into said air receiving chamber, an air outlet at each side of the condenser from the receiving chamber, an outlet for condensate at the base of the condenser, and a plurality of guide plates arranged to divide the cross section of said steam condensing chamber into a plu-

5 rality of condensing chambers arranged in parallel, the central steam condensing chamber discharging into a downwardly extending passage, the sides of said passage forming in part the sides of the adjacent condensing chambers, substantially as described and for the purpose herein set forth.

Signed at West Hartlepool, in the county of Durham, England, this fifth day of October 1914.

DONALD BARNES MORISON.

Witnesses:

JAMES GUNN,
FRED ALCOCK.