

No. 862,515.

PATENTED AUG. 6, 1907.

W. SCHWANHAUSSER.
SURFACE CONDENSER.

APPLICATION FILED AUG. 12, 1905.

3 SHEETS—SHEET 1.

Fig. 1.

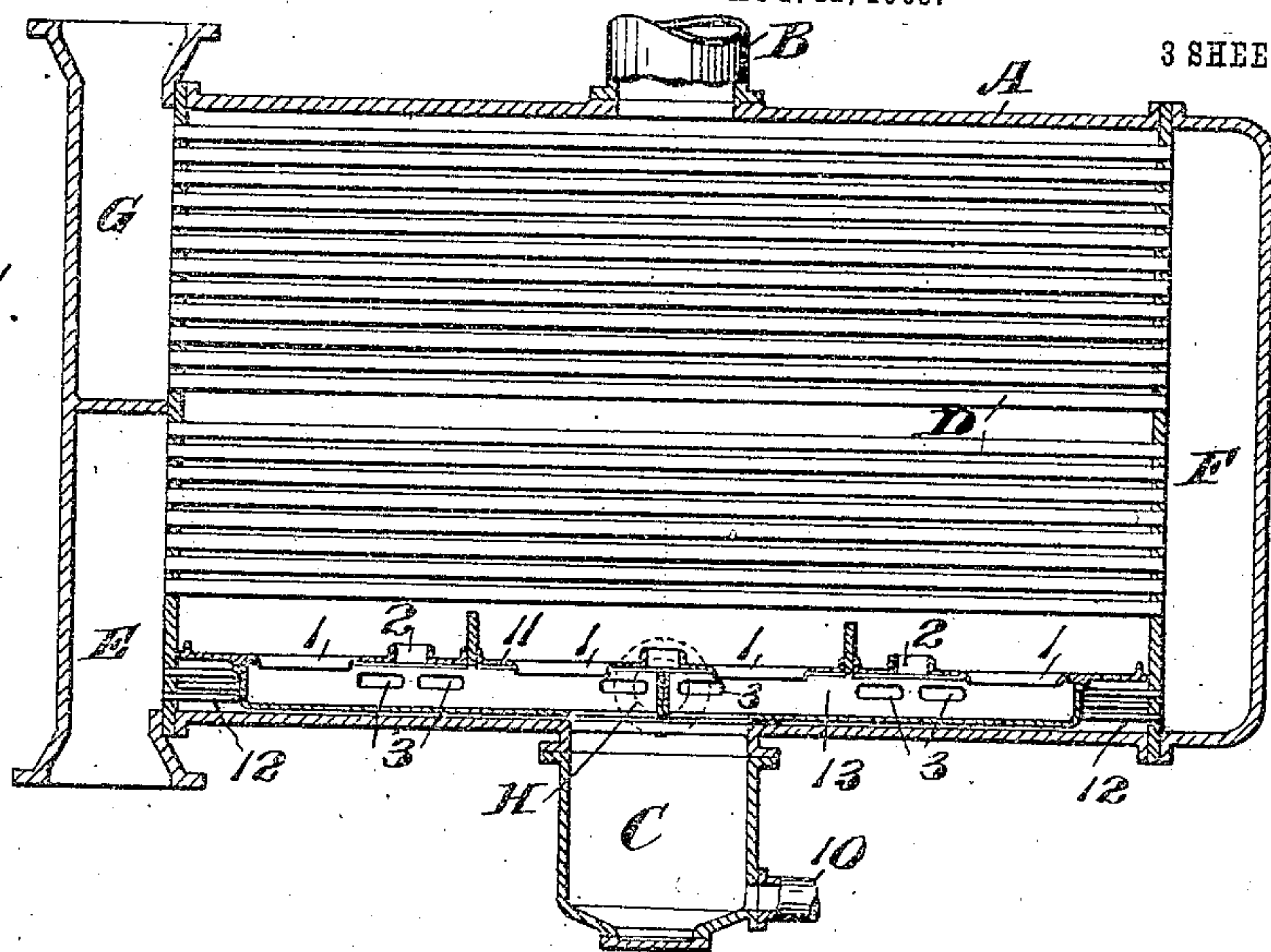


Fig. 2.

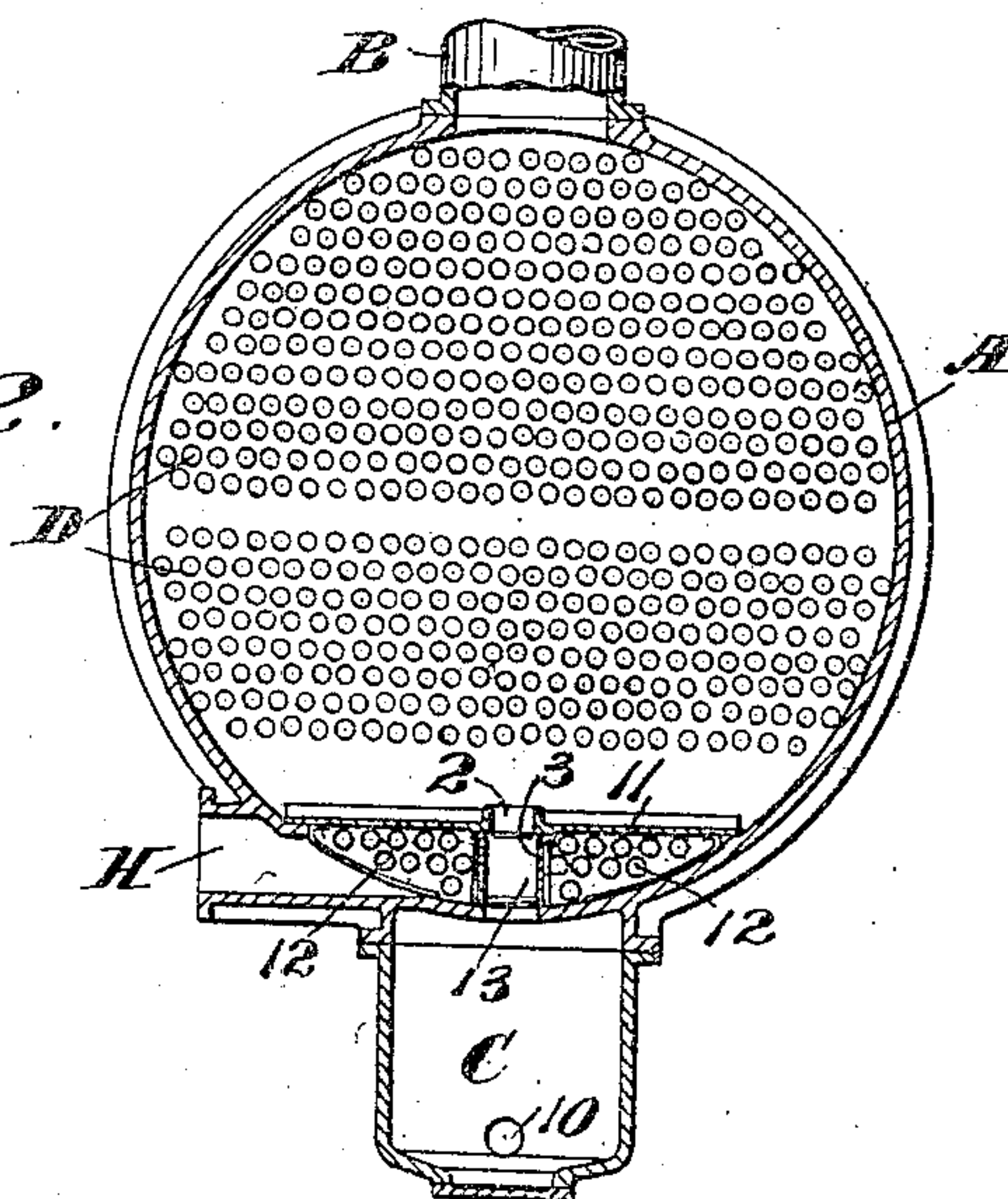
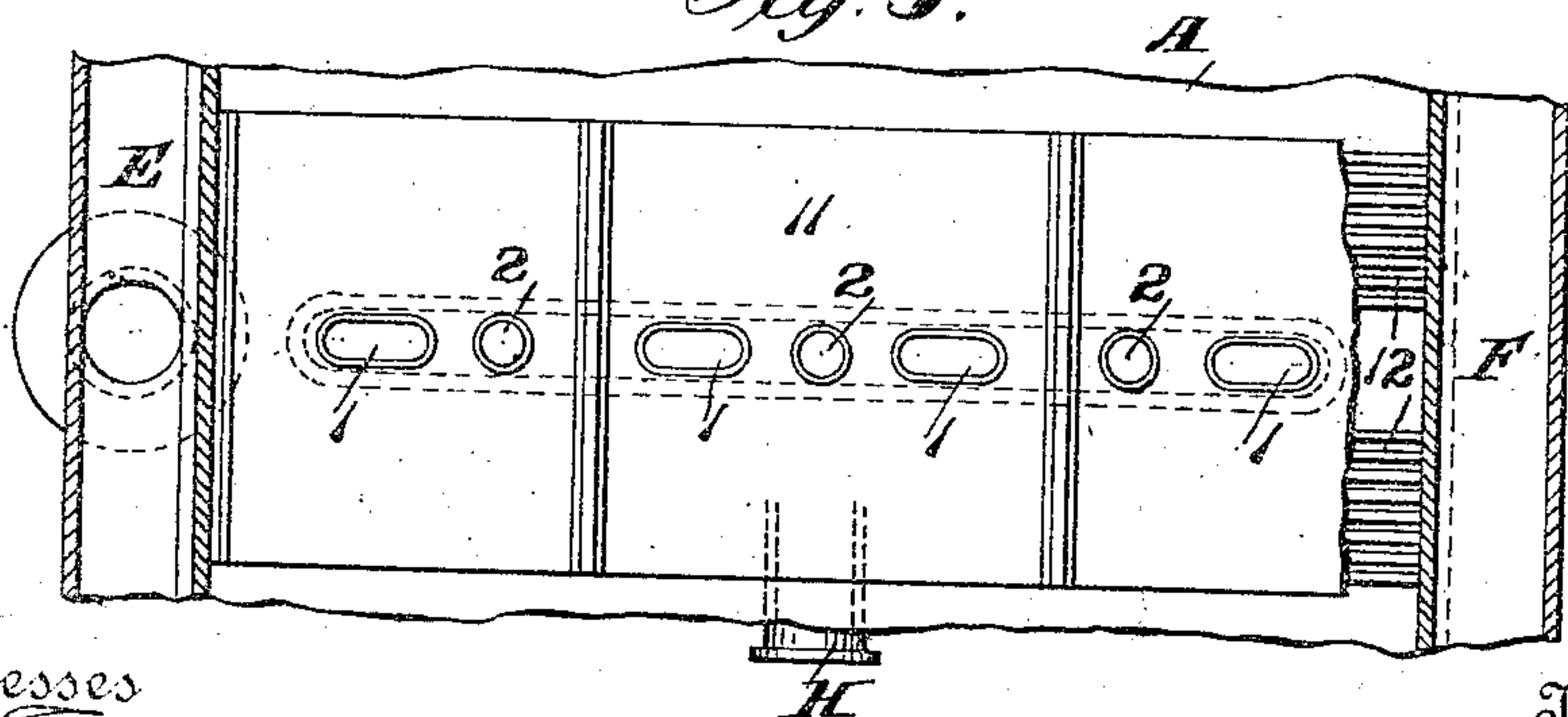


Fig. 3.



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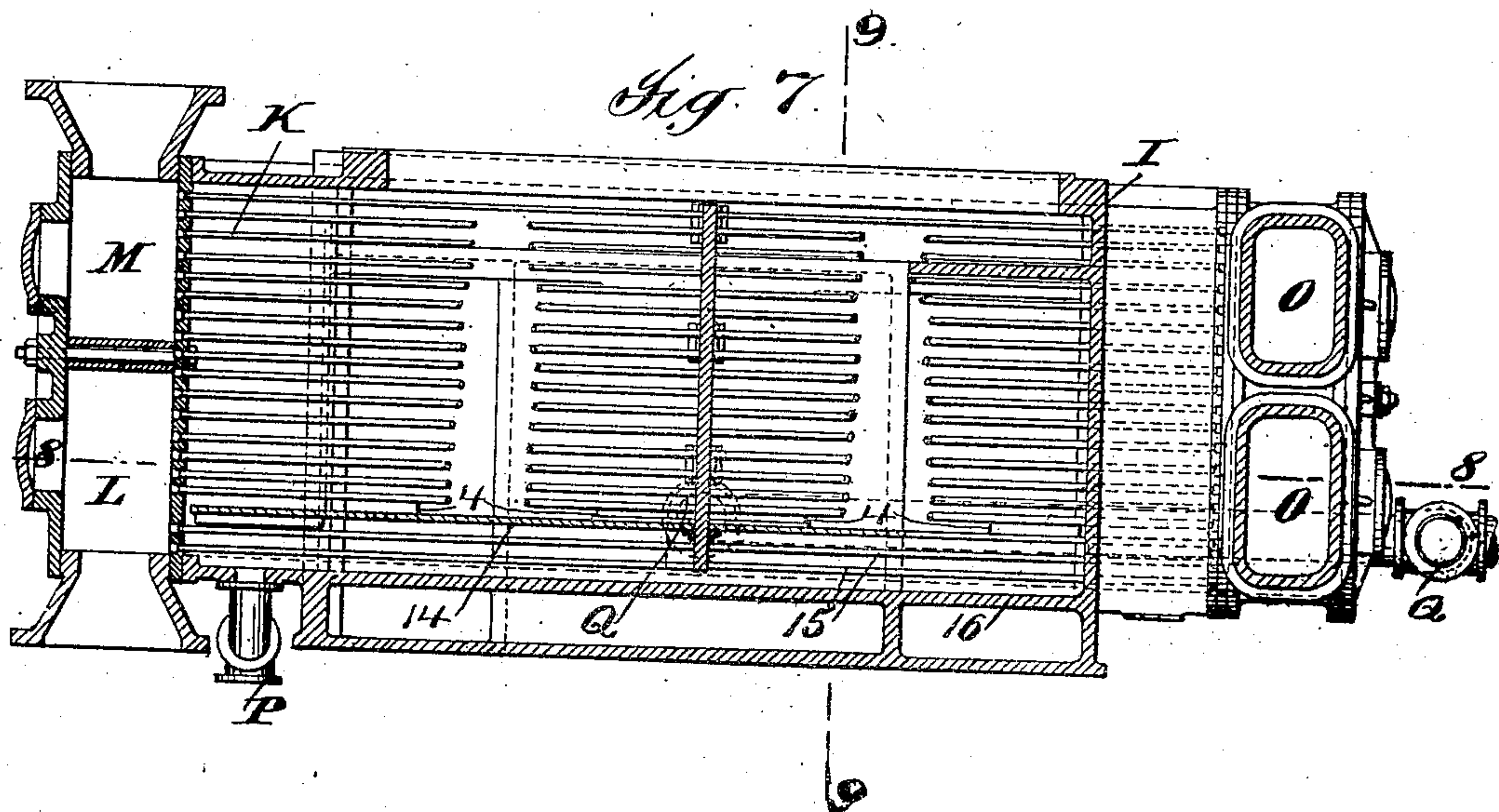
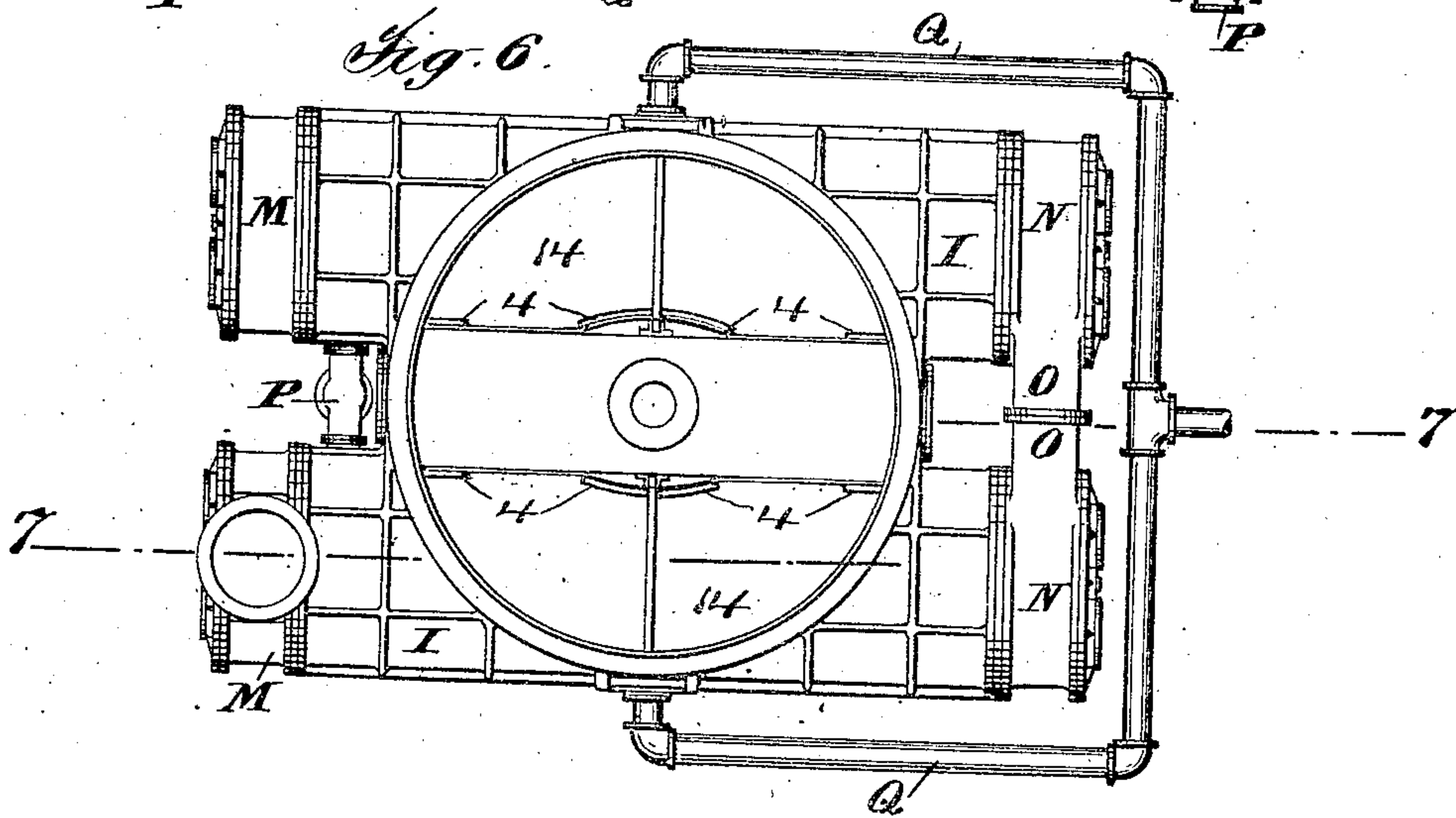
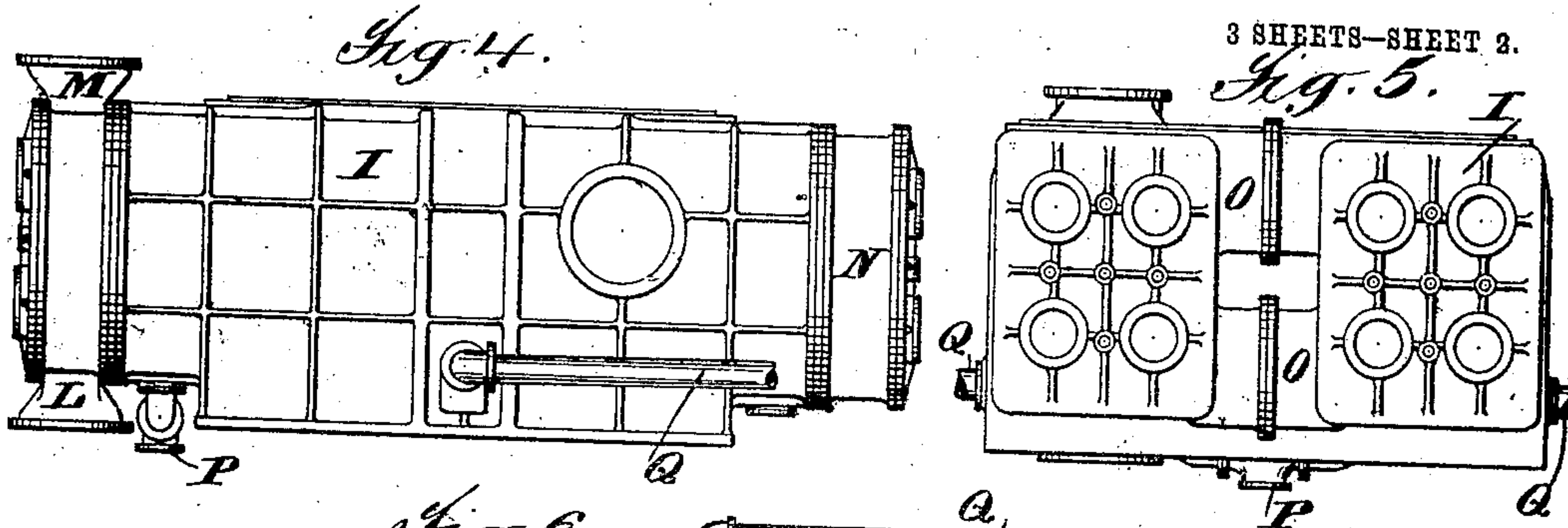
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3 SHEETS—SHEET 2.



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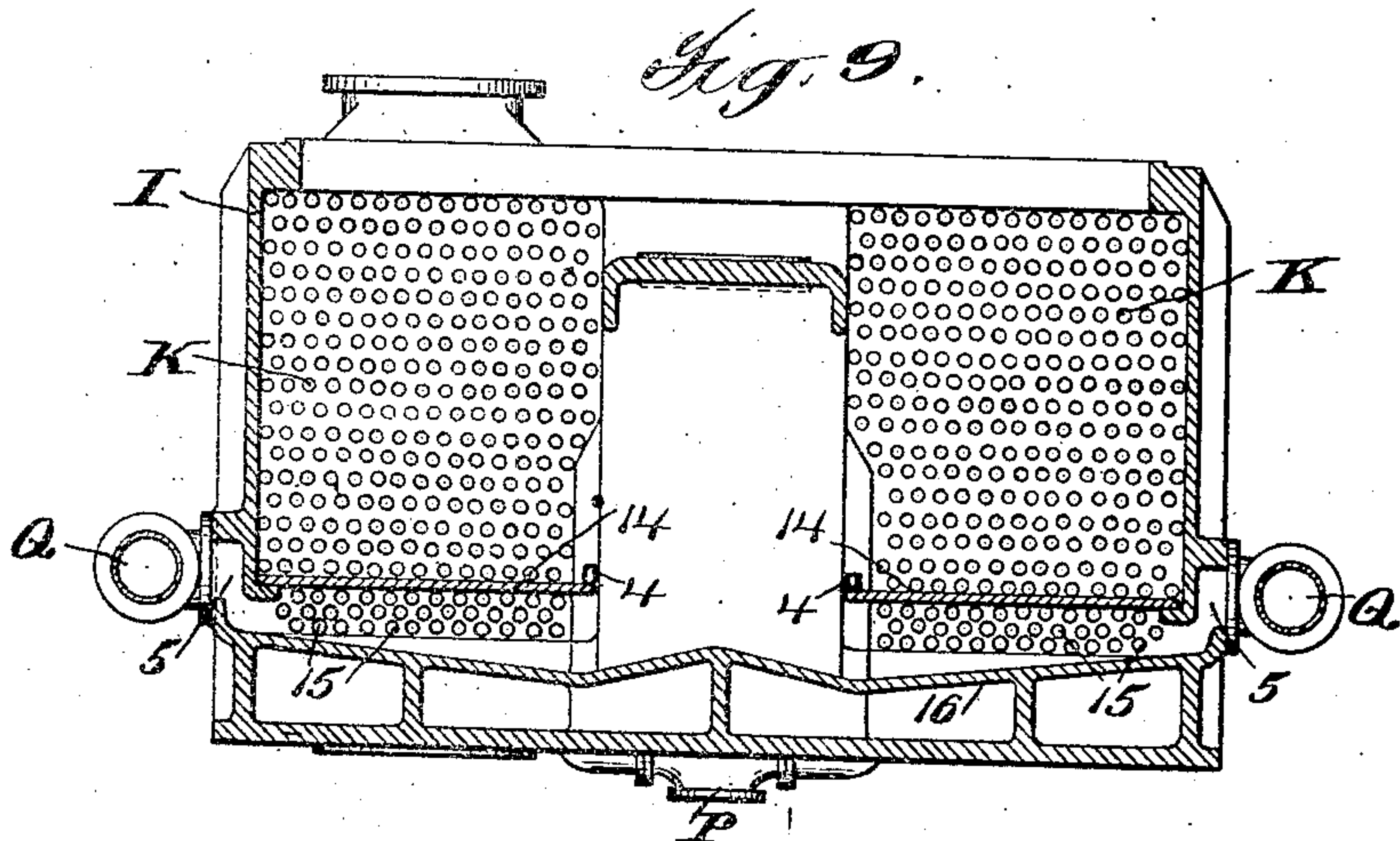
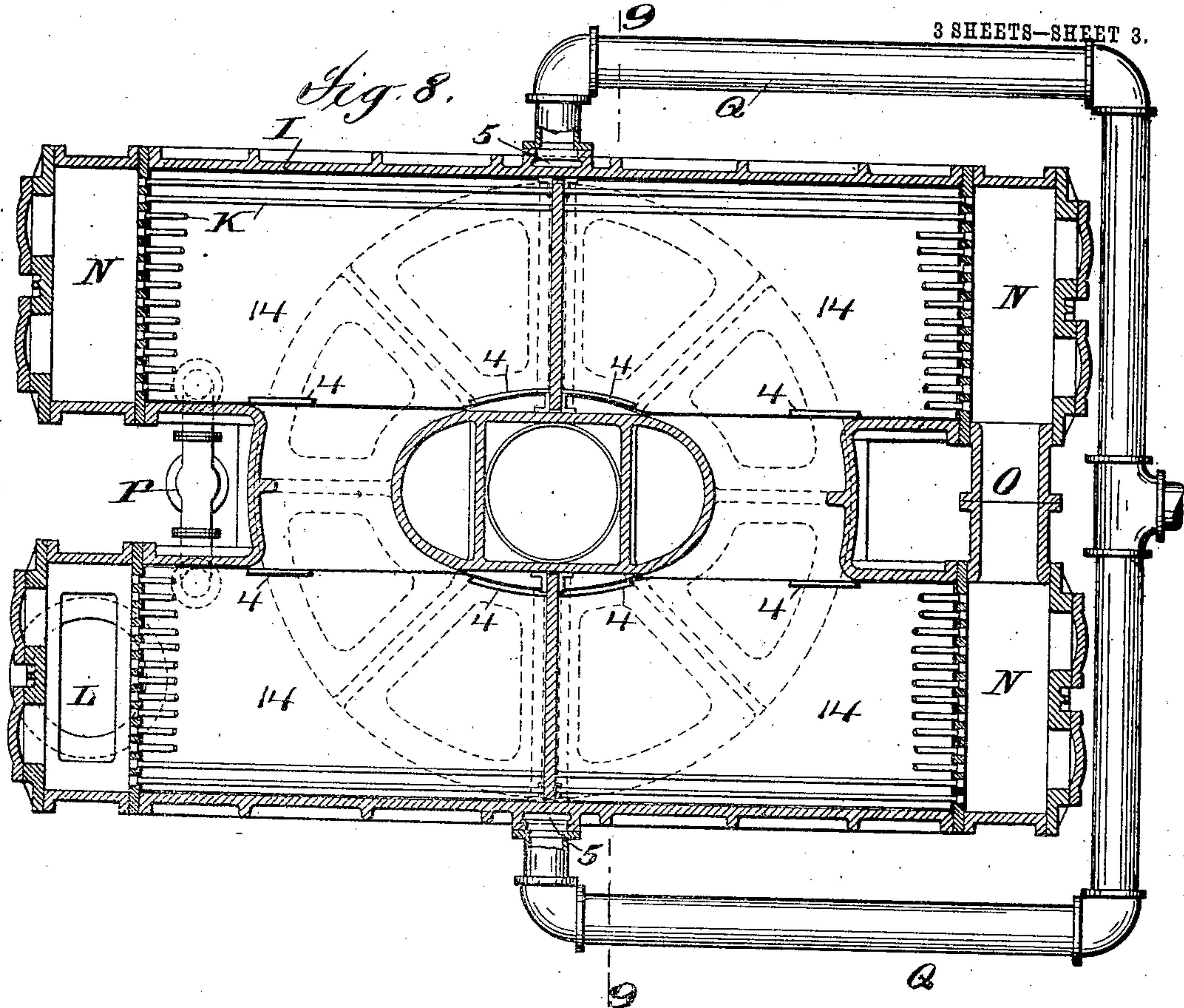
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

WILLIAM SCHWANHAUSSER, OF NEW YORK, N. Y., ASSIGNOR TO HENRY R. WORTHINGTON,
OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

SURFACE CONDENSER.

No. 862,515.

Specification of Letters Patent.

Patented Aug. 6, 1907.

Application filed August 12, 1905. Serial No. 273,856.

To all whom it may concern:

Be it known that I, WILLIAM SCHWANHAUSSER, a citizen of the United States, residing at New York city, county of Kings, and State of New York, have invented certain new and useful Improvements in Surface Condensers, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to that class of condenser systems employing surface condensers from which the air and uncondensed vapors are withdrawn separately from the water of condensation by an air or vacuum pump. the especial object of the invention being to provide an improved construction of surface condenser for efficiently separating the air and uncondensed vapor from the water and cooling them for delivery by the air or vacuum pump.

In constructions embodying the present invention, the air and uncondensed vapor is drawn off from the lower part of the condenser through an air cooler located in the bottom of the condenser and cooled by the condensing water, so that the air is efficiently removed and cooled, and the combined condenser and air cooler is simple and cheap in construction and convenient in use.

The invention is illustrated in the accompanying drawings forming a part of this specification, as applied in two forms of surface condensers, embodying the invention in the preferred forms, and these constructions will now be described in detail, and the features forming the invention then specifically pointed out in the claims.

In the drawings—Figure 1 is a vertical section of an ordinary cylindrical surface condenser modified in accordance with my invention. Fig. 2 is a vertical central cross section of the same. Fig. 3 is a horizontal section above the air cooler with the top plate of the air cooler partly broken away. Figs. 4, 5 and 6 are respectively side and end elevations and plan view of a steam turbine condenser embodying the invention. Fig. 7 is a vertical section on line 7 of Fig. 6, on an enlarged scale. Fig. 8 is a horizontal section on the line 8 of Fig. 7. Fig. 9 is a vertical cross section on the line 9 of Figs. 7 and 8.

Referring now to the construction shown in Figs. 1 to 3, A is a horizontal condenser having the inlet B at the top for the exhaust steam and the usual well C at the bottom for the water of condensation, this well being connected by pipe 10 to the discharge pump. The condenser has the usual tubes D for the circulating or condensing water, which water enters the inlet chamber E at one end of the condenser, passes through the lower tubes and the chamber F at the opposite end of the

condenser, then through the upper tubes to the outlet chamber G.

All the parts thus far described are well-known and may be of any common or suitable construction.

Referring now to the parts embodying the invention, an air cooler is formed in the bottom of the condenser A by plate 11 shown as resting upon shoulders on the opposite sides of the condenser, and covering a space between it and the bottom of the condenser through which pass tubes 12 which may be similar to the condenser tubes D, and which connect the chambers E, F, so that some of the condensing water passes through these tubes and cools the air in the air cooler below the plate 11. In the bottom of the condenser is a narrow trough 13 extending longitudinally of the central portion of the condenser bottom, and this trough receives the water of condensation from the condenser through the openings 1 in the plate 11 and it passes from the trough 13 to the well C through a central opening in the bottom of the trough above the well. The air from the condenser passes to the air cooler through the trough 13 by openings 2 in the plate 11 and openings 3 in the upper portion of the side walls of the trough. The openings 2 are provided with upwardly extending flanges, as shown, so as to prevent the water flowing through these openings, and the side openings 3 of the trough are raised sufficiently above the bottom of the trough to permit the air to pass out into the air cooler above the water of condensation flowing to the well C.

The air is drawn off from the air cooler below the plate 11 through outlet pipe H to which the air or suction pump is connected, the air being efficiently separated from the water and cooled before leaving the condenser casing.

The construction shown in Figs. 4 to 9 is adapted for use with the condenser forming a support for the steam turbine, which is mounted upon and exhausts directly to the condenser, the condenser being formed in two longitudinal sections, or having a central chamber, to provide a central support for the turbine and accommodate the turbine shaft. In this construction I is the condenser casing provided with the tubes K and having the inlet chamber L and outlet chamber M in one section, the circulating chambers N, and the passages O connecting the upper and lower circulating chambers at one end of the condenser. The discharge water is drawn off from both sections of the condenser by the discharge pipe P and the air and uncondensed vapors are drawn off centrally from the sides of the two condenser sections by pipes Q connected to the air or vacuum pump.

Referring now to the air cooler construction, the

air cooler is formed by a space in the bottom of each condenser section, provided with a top plate 14 shown as supported by shoulders on the condenser walls, these plates 14 being provided at their inner sides with upwardly extending flanges 4 which are cut away through a portion of their length to allow the water of condensation to flow from the plates to the central space between the condenser sections, while the air passes to this central space above the flanges 4 and then is drawn downward and outward through the air cooler between the streams of water flowing from the plates 14 where the flanges are cut away. The air cooler tubes 15 are within the space between the plates 14 and the bottom wall 16 of the condenser, this bottom wall 16 being inclined as shown so as to direct the water of condensation downward and to the discharge pipes P.

The air cooler acts as a supplementary condenser, and any water condensed from the vapor by the tubes 15 will flow down the inclined bottom 16 and thus be delivered with the water that is condensed by the tubes K and which flows over the edge of the plates 14. The air passes through the cooler above the water and outward through passages 5 to the air pipes Q and is drawn off by the air or suction pump, being efficiently separated from the water of condensation and cooled before leaving the condenser casing.

It will be understood that the invention is not to be limited to the special types of surface condenser shown, nor to the exact form or arrangement of devices for separating and cooling the air, but that the invention may be applied to surface condensers of other forms than those shown, and many modifications may be made in the devices for carrying out the invention.

What I claim is:—

1. A surface condenser having an air cooler in the lower part of the condenser below the condensing surfaces and provided with passages for the condensing water to cool the air cooler and for the air to pass from the condenser separately from the water of condensation. 35

2. A surface condenser having a bottom space separated from the condensing space by a horizontal partition, constructed to permit the passage of the air and water of condensation from the condensing space to the space below said partition, separate deliveries for said air and water of condensation, and tubes through which the condensing water passes within said space for cooling the air and condensing vapor therein on its way to its delivery. 40 45

3. A surface condenser having a bottom plate over which the water of condensation passes to its delivery, a partition above said plate with space between the partition and bottom plate providing for the passage of air and water of condensation from the condenser, tubes below the partition through which the condensing water passes to form an air cooler, and an air delivery to which the air passes from said cooler. 50 55

4. The combination with the condenser casing, of plate 11 forming a partition to separate the lower portion of the space within the casing from the condensing space, tubes 12 in the bottom space through which the condensing water passes to form an air cooler, trough 13 below the plate 11, said plate and trough having openings for the passage of water of condensation from the condensing space to the water delivery and openings for the passage of air from the condensing space through said trough above the water of condensation to the air cooler, and an air delivery from the air cooler. 60 65

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

WILLIAM SCHWANHAUSSER.

Witnesses:

AUGUSTA WHITE,
C. J. SAWYER.