No. 824,312. PATENTED JUNE 26, 1906.

W. SCHWANHAUSSER.

CONDENSER.

APPLICATION FILED AUG. 17, 1903.

2 SHEETS—SHEET 1.

Fig. 3.

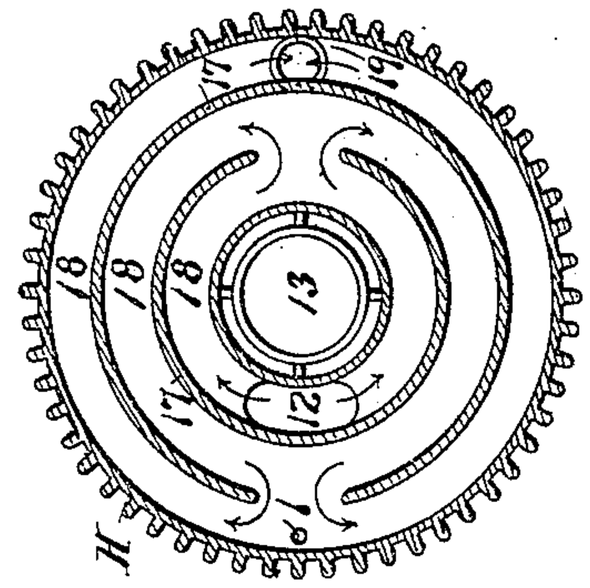

Fig. 4.

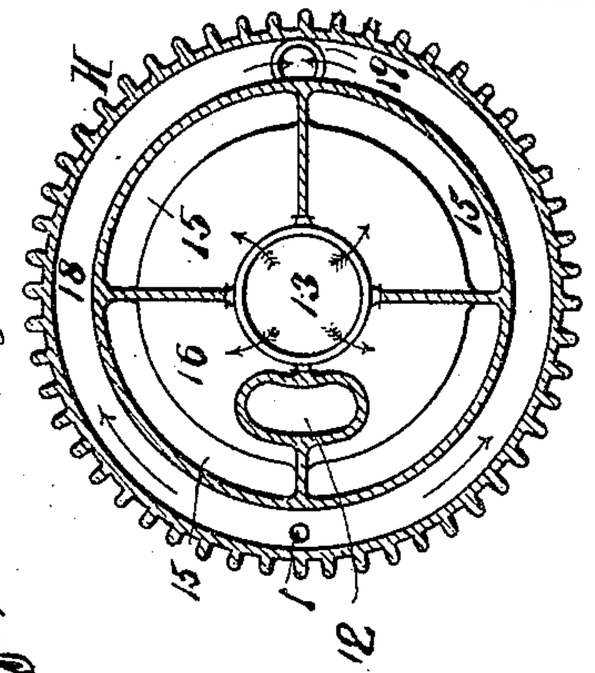

Fig. 2.

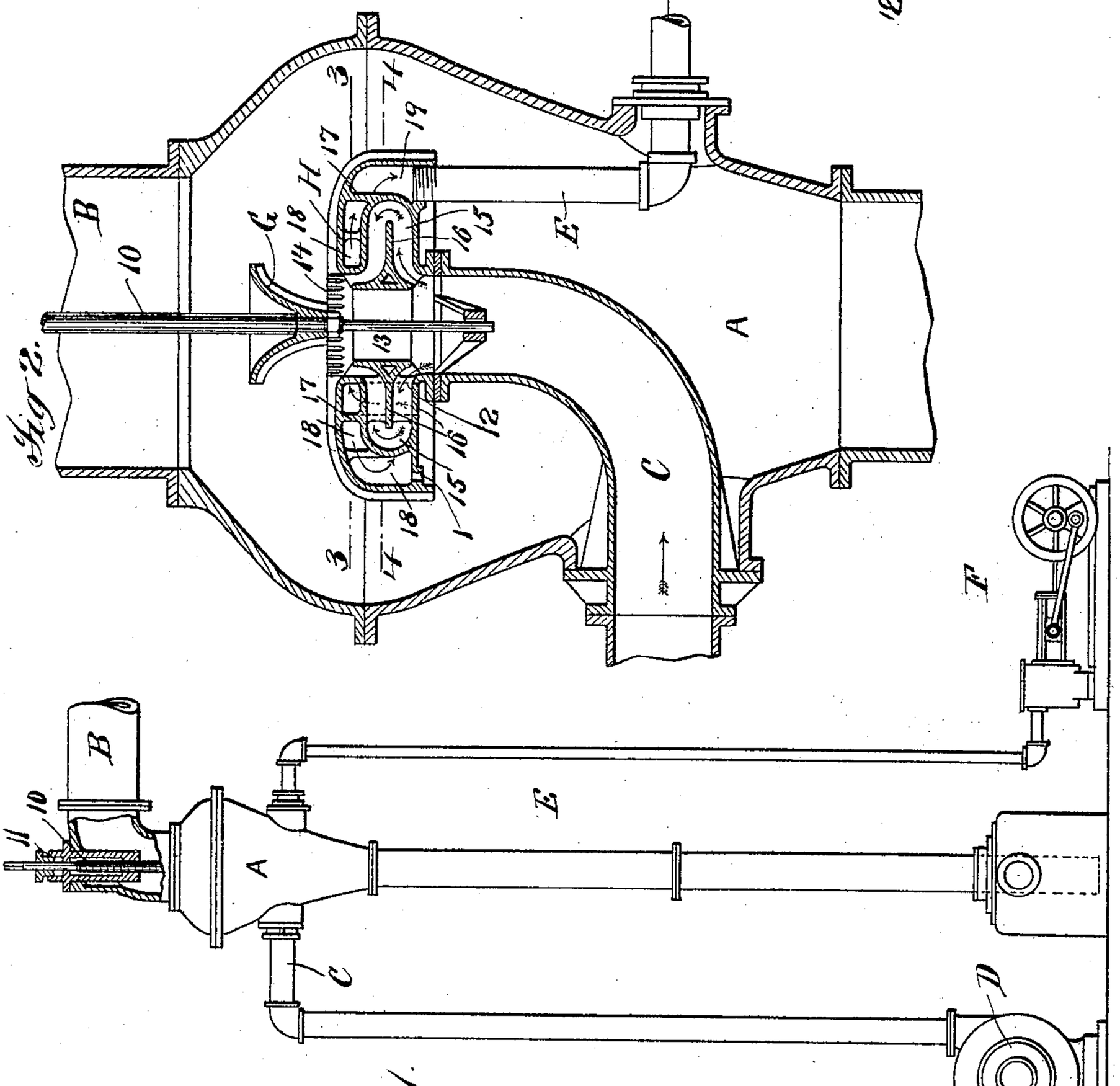

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 7.

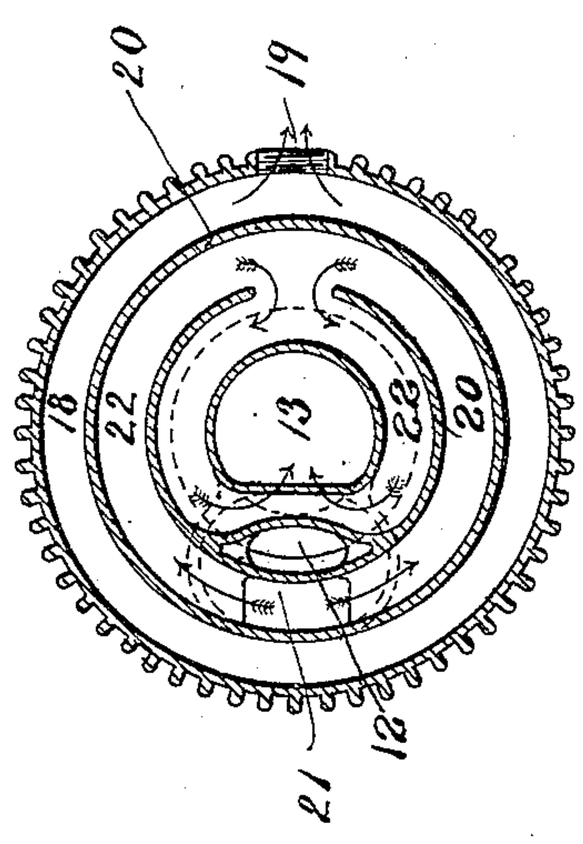


Fig. 8.

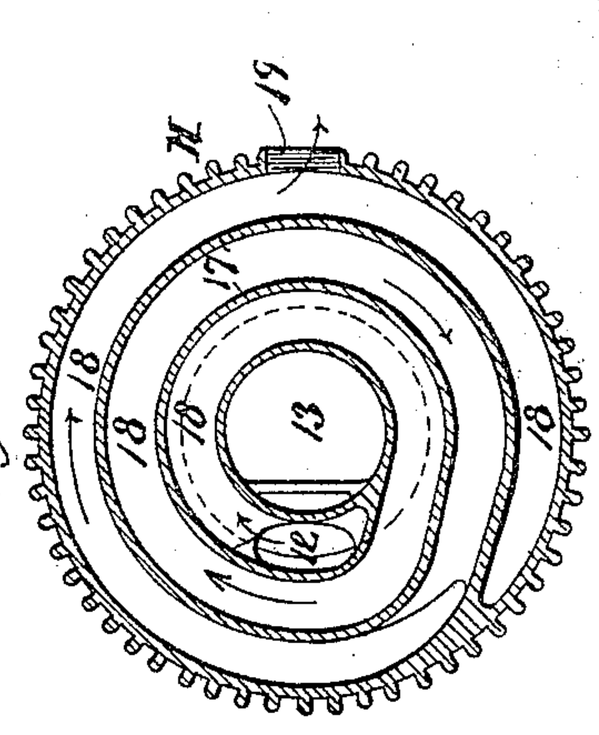


Fig. 6.

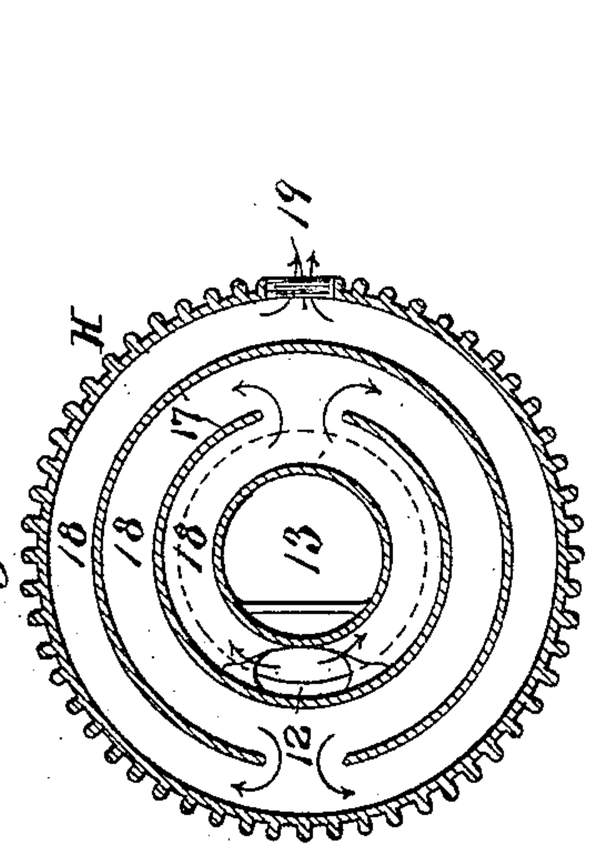
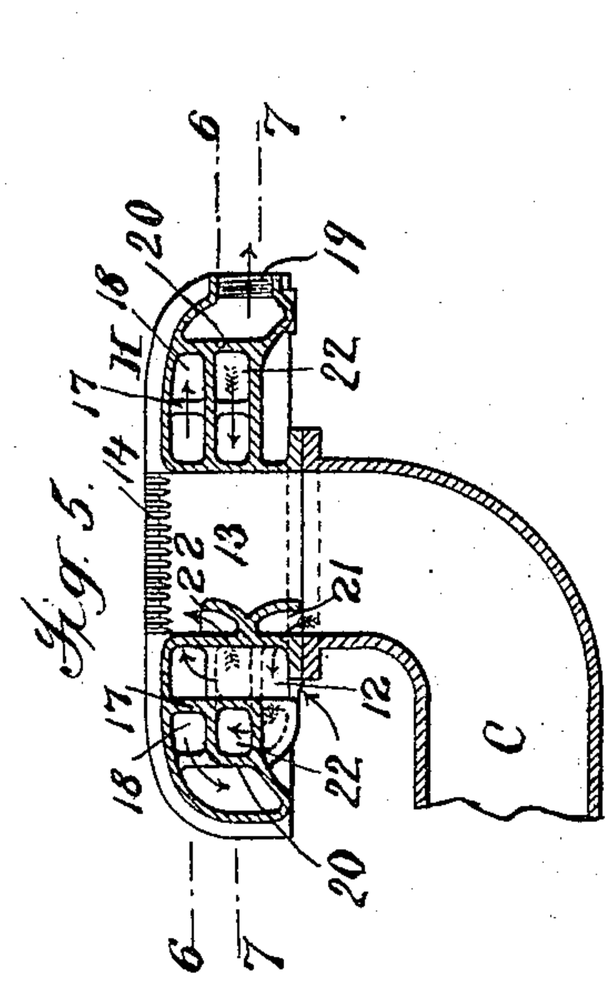


Fig. 5.



Attest.
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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.

CONDENSER.

No. 824,312. Specification of Letters Patent. Patented June 26, 1906.

Application filed August 17, 1903. Serial No. 169,743.

To all whom it may concern:

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

The object of the present invention is to provide improved means for collecting and cooling the air and uncondensed vapors in the condensing-chamber of that class of condensing systems in which the air and uncondensed vapors or part of these are removed from the condensing-chamber separately from the discharge water, the especial object of the invention being to provide a simple, cheap, and compact construction by which an efficient cooling action shall be secured by liquid-cooled surfaces.

For a full understanding of the invention a detailed description of constructions embodying all the features of the same as applied in preferred forms will now be given in connection with the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a diagrammatic elevation of a condenser system embodying the invention as applied to a common type of gravity injector condenser system. Fig. 2 is a central vertical section of the condensing-chamber and air-cooler. Figs. 3 and 4 are horizontal sections of the air-cooler on lines 3 and 4 of Fig. 2. Fig. 5 is a section of the air-cooler similar to Fig. 2, showing a modification. Figs. 6 and 7 are sections on the lines 6 and 7 of Fig. 5. Fig. 8 is a section similar to Fig. 6, showing a modified form of air-passages.

In the drawings, A is the condensing-chamber; B, the steam-pipe entering at the top; C, the condensing-water pipe through which the condensing water is forced by the circulating-pump D, and E the air-pipe through which the air and uncondensed vapors are drawn off by air-pump F. The condensing-water pipe C enters the lower part of the condensing-chamber A and extends upward centrally of the chamber, the water being delivered from its upper end past an adjustable spray-nozzle G, which is ribbed vertically on its periphery and carried by a vertical rod 10, movable vertically for adjustment of the nozzle G by being screw-threaded through a stuffing-box 11 in the steam-pipe elbow, as usual in such constructions. All the parts thus far described are shown as of a form common in this class of condensers; but it will be understood that they may be of any other suitable form.

Referring now to the means for collecting and cooling the air and uncondensed vapors, to which the present invention especially relates, there is mounted on top of the condensing-water pipe C, so that the condensing water passes upward through it to the spray-nozzle G, an air-chamber H, extending over a considerable part of the condensing-chamber and which receives upon its lower side, preferably through an air-inlet 12, as shown, the air and uncondensed vapors arising from the lower part of the condenser within the space between the falling condensing water and the condensing-water pipe C.

The top and side walls of the air-chamber E are preferably curved, as shown, so as to form a hood or bell, and the chamber is provided with a central passage 13, forming a continuation of the condensing-water pipe C and through which the water passes to the spray-nozzle G, the upper part of the air-chamber being provided with ribs 14, forming slots similar to those of the ordinary spray-pipe through which the water is sprayed out sidewise past the spray-nozzle G, so as to fall in a shower upon the top of the air-chamber H and within the space surrounding the air-chamber. These ribs 14 may be continued over the top and side walls of the air-chamber, as shown, for distributing the water or may be of such extent only as to form a spray end of the passage 13, or this spray-pipe for coacting with the spray-nozzle G may be otherwise formed.

The air-chamber H may be provided only with the central water-passage 13 and all the water from the condensing-pipe C passes through this; but for securing a more efficient cooling action it is desirable that the water shall be applied so as to cool the opposite side walls of air-passages in the chamber H, and this result is secured in the construction shown in Figs. 1 to 4 by providing a water passage or chamber 15, curved outward from the top of the pipe C around a central horizontal deflecting-plate 16 and then in-

ward and upward to the spray-delivery, outside of which water passage or chamber 15 is the inner wall of the air-passages, so that this inner wall of the air-passages is thus efficiently cooled by the condensing water in addition to the cooling of the outer wall of the air-passages by the water sprayed upon the top and side walls of the air-chamber. The construction shown provides also for adjusting the spray-nozzle G down into the passage 13, so as to limit the amount of water passing through the passage 13 without choking substantially the passage 15, so that water for cooling the air is always provided even though little condensing water be required. The air-chamber H is divided by vertical partitions 17 into air-passages 18, through which the air is conducted in a tortuous course from the air-inlet 12 to the air-outlet 19, which latter outlet 19 is connected to the air-pipe E, the air and uncondensed vapors thus remaining in contact with water cooled by surfaces in the air-chamber for a considerable time, thus securing an efficient action with a very compact air-cooler. A drip-opening 1 may be provided in the bottom of the air-chamber, through which any condensation from vapors in the air-passages will return to the condensing-chamber.

In the construction shown in Figs. 1 to 4 these air-passages 18 are circular and concentric, the successive passages being connected by openings diametrically opposite each other, so that the air enters on one side of the chamber and leaves it at the opposite side, as shown by the plain arrows in Figs. 3 and 4, thus securing a long course of the air from the inlet 12 to the outlet 19. The course of the water in Fig. 4 as well as in Fig. 1 is shown by the feathered arrows.

The construction shown in Figs. 5, 6, and 7 is substantially the same as shown in Figs. 1 to 4, except that the water-passages are arranged differently. Instead of there being a continuous water passage or chamber about the top of the pipe C the water-space is divided horizontally into a series of water-passages below the air-passages 18 by vertical partitions 20, and the water from the pipe C enters these passages through opening 21 at one side of the top of the pipe C and then passes through water-passages 22 below the air-passages 18 in the same manner as above described in connection with the air-passages. In Figs. 5, 6, and 7 the feathered arrows show the course of the water and the plain arrows the course of the air through their respective passages.

It will be understood that the invention is applicable to condensers of different classes, and that in condensers of the general class of that shown the air and water passages may be arranged in any other suitable manner within the broader features of the invention, so as to secure the desired contact of the air with liquid-cooled surfaces in the air-chamber, and that widely-different forms of air and water passages may be used for this purpose. Thus I have shown in Fig. 8 for purpose of illustration spiral air-passages 18, through which the air is conducted in a spiral course from the inlet 12 to the outlet 19, and the same spiral arrangement of water-passages may be used in place of those shown in Figs. 5 and 7. The air-chamber and condensing-water pipe may be otherwise arranged also, this depending somewhat on the style of condenser to which the invention is applied. The particular arrangement shown, however, is claimed as a specific feature of the invention.

What is claimed is—

1. The combination with a condensing-chamber, of an air-cooler therein consisting of a horizontally-arranged casing provided with an air-inlet on its lower side and with an air-outlet, means for delivering water over the top of the air-cooler, and partitions in the casing dividing the space below the cooled top wall into air-passages connecting the air inlet and outlet.

2. The combination with a condensing-chamber, of an air-cooler therein consisting of a horizontally-arranged casing provided with an air-inlet on its lower side and with an air-outlet, partitions in the casing dividing the space within its top and side walls into air-passages connecting the air inlet and outlet, and means for applying cooling-water on the opposite side walls of said air-passages.

3. The combination with a condensing-chamber and its condensing-water pipe and spraying devices, of an air-cooler consisting of a horizontal casing arranged centrally of the condenser-chamber and beneath the condensing-water spray and provided with an air-inlet on its lower side and with an air-outlet, partitions in the casing dividing the space within the cooled walls of the casing into air-passages connecting the inlet and outlet.

4. The combination with a condensing-chamber and its condensing-water pipe and spraying devices, of an air-cooler within the condensing-chamber consisting of a casing positioned to receive the condensing-water spray and provided with an air-inlet on its lower side and with an air-outlet, air-passages within the casing connecting the air inlet and outlet and adapted to conduct the air through the air-cooler in contact with the walls cooled by the spray, and water-passages in the casing for conducting the condensing water along the inner walls of the air-passages.

5. The combination with the condensing-chamber A and its condensing-water pipe C extending upward centrally of the chamber, of the air-cooler consisting of the horizontally-arranged casing H mounted on the con-

densing-water pipe and having air-inlet 12 on its lower side, air-outlet 19, and air-passages 18 within the casing connecting the inlet and outlet, a condensing-water passage through the air-cooler, and means for spraying water from said water-passage over the air-cooler.

6. The combination with the condensing-chamber A and its condensing-water pipe C extending upward centrally of the chamber, of the air-cooler consisting of the horizontally-arranged casing H mounted on the condensing-water pipe and having air-inlet 12, air-outlet 19, and air-passages 18 within the casing connecting the inlet and outlet, and water-passages through the air-cooler arranged to apply condensing water to the inner walls of the air-passages 18, and means for spraying the condensing water over the air-cooler.

7. The combination with the condensing-chamber A and its condensing-water pipe C extending upward centrally of the chamber, of the air-cooler H mounted on the condensing-water pipe and having air-inlet 12, air-outlet 19, and air-passages 18 connecting the inlet and outlet, condensing-water passage 13 through the air-cooler, means for spraying water over the air-cooler, means for adjusting the amount of water passing through the passage 13, and water-passages through the air-cooler for applying condensing water to the inner walls of the air-passages and arranged to permit the passage of water to the spraying devices when the passage 13 is closed.

8. Air-cooler H having a top hood and an air-inlet from below and an air-outlet, air-passages 18 connecting the inlet and outlet arranged to secure a long travel of the air in the cooler within the hood and central water-passage 13 through the cooler.

9. Air-cooler H having a top hood and an air-inlet from below and an air-outlet, air-passages 18 connecting the inlet and outlet arranged to secure a long travel of the air in the cooler within the hood and water-passages through the cooler arranged to circulate water along the inner walls of the air-passages.

10. An air-cooler for condensers consisting of a casing adapted to be mounted centrally on a condensing-water pipe and provided with partitions dividing the space within the top and side walls of the casing into tortuous air-passages connecting an air inlet and outlet the outer walls of which are formed by the top and side walls of the casing, and a central water-passage through the cooler, the top of the cooler being formed to provide a spray-pipe.

11. An air-cooler for condensers consisting of a casing in the form of a hood or bell with partitions dividing the space inside the cooler into air-passages next the outer wall or hood of the cooler and water-passages along the inner walls of the air-passages.

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

WILLIAM SCHWANHAUSSER.

Witnesses:

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T. F. KEHOE.