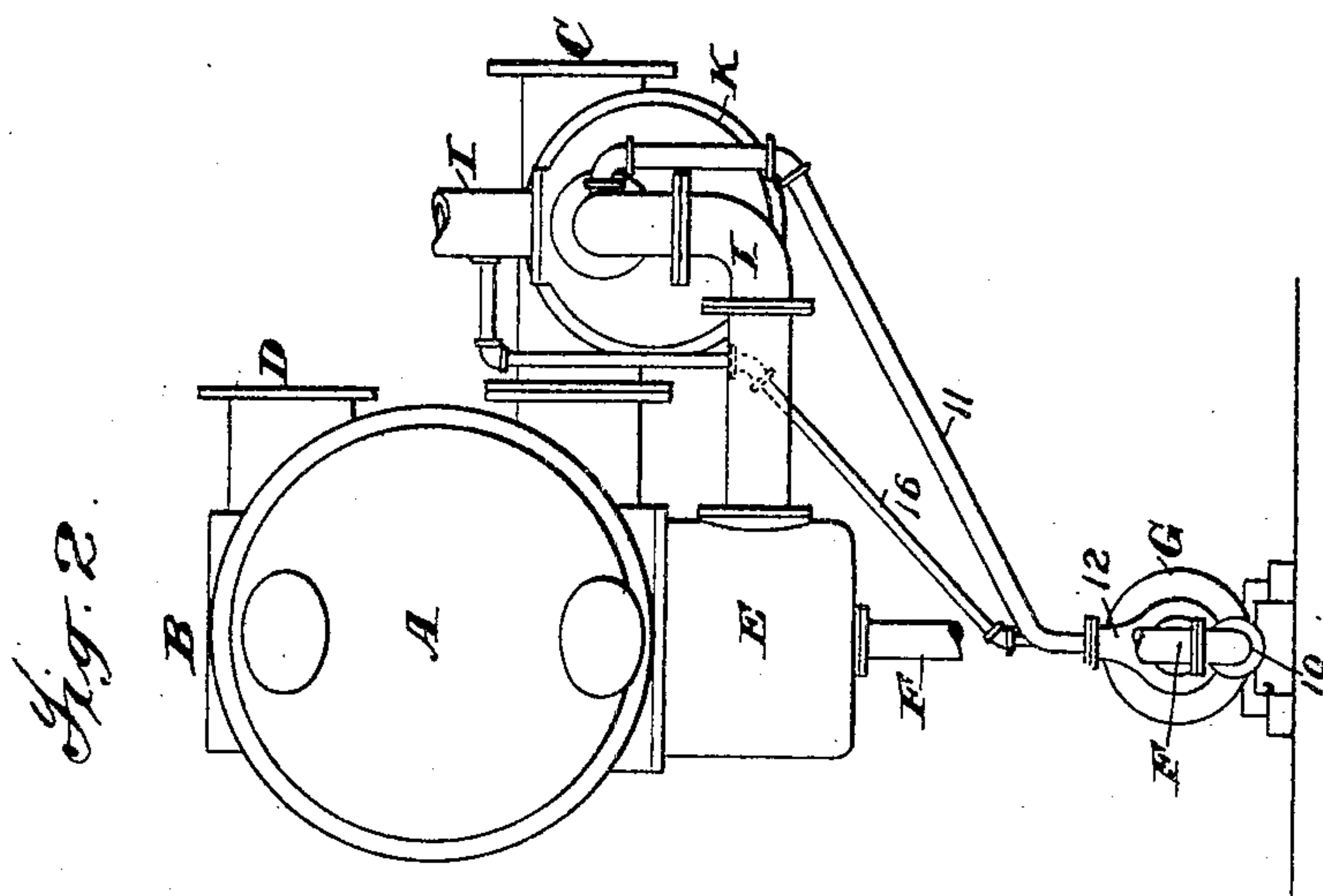
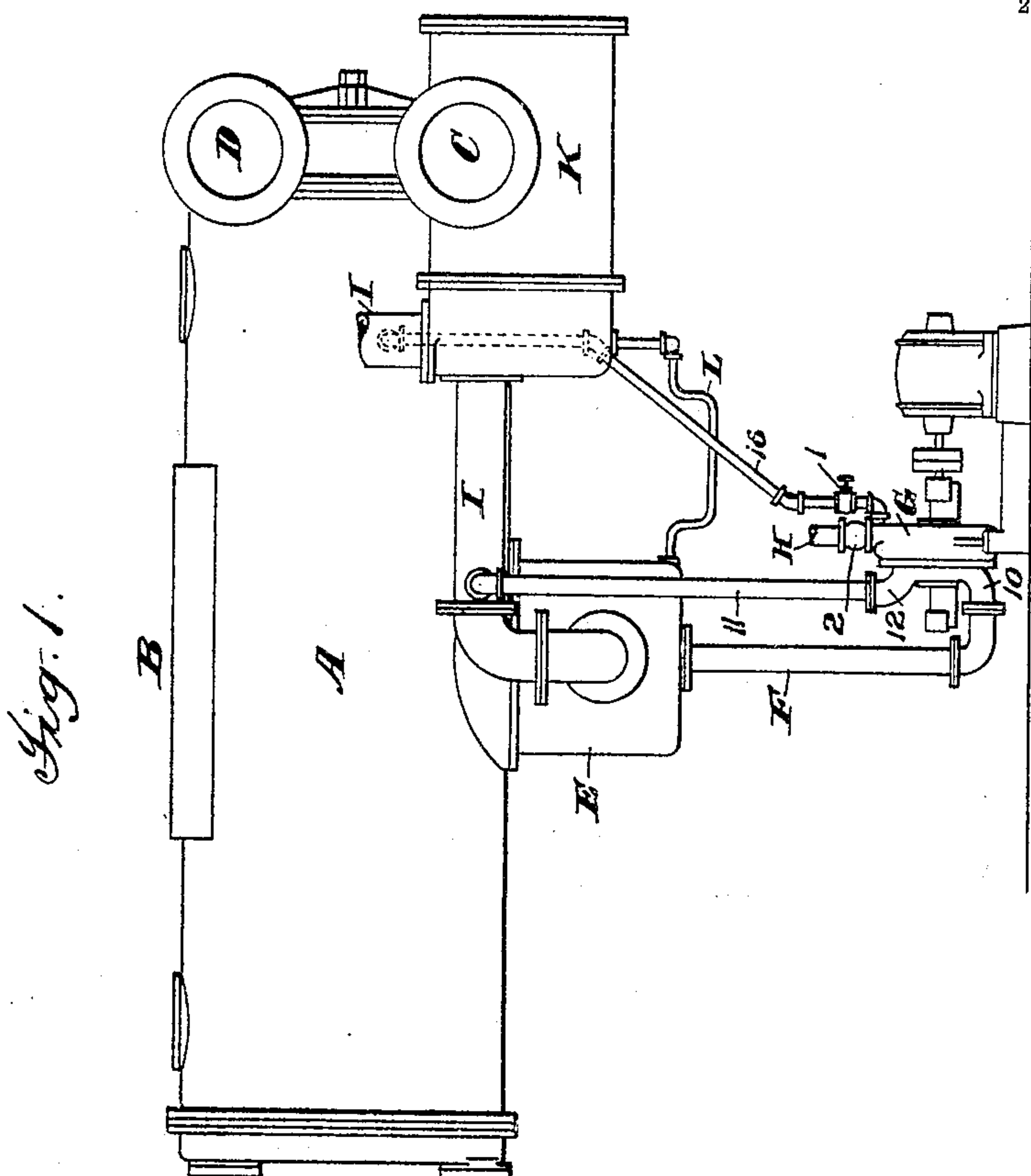


No. 803,787.

PATENTED NOV. 7, 1905.

F. RAY.
CONDENSER SYSTEM.
APPLICATION FILED AUG. 6, 1904.

2 SHEETS—SHEET 1.

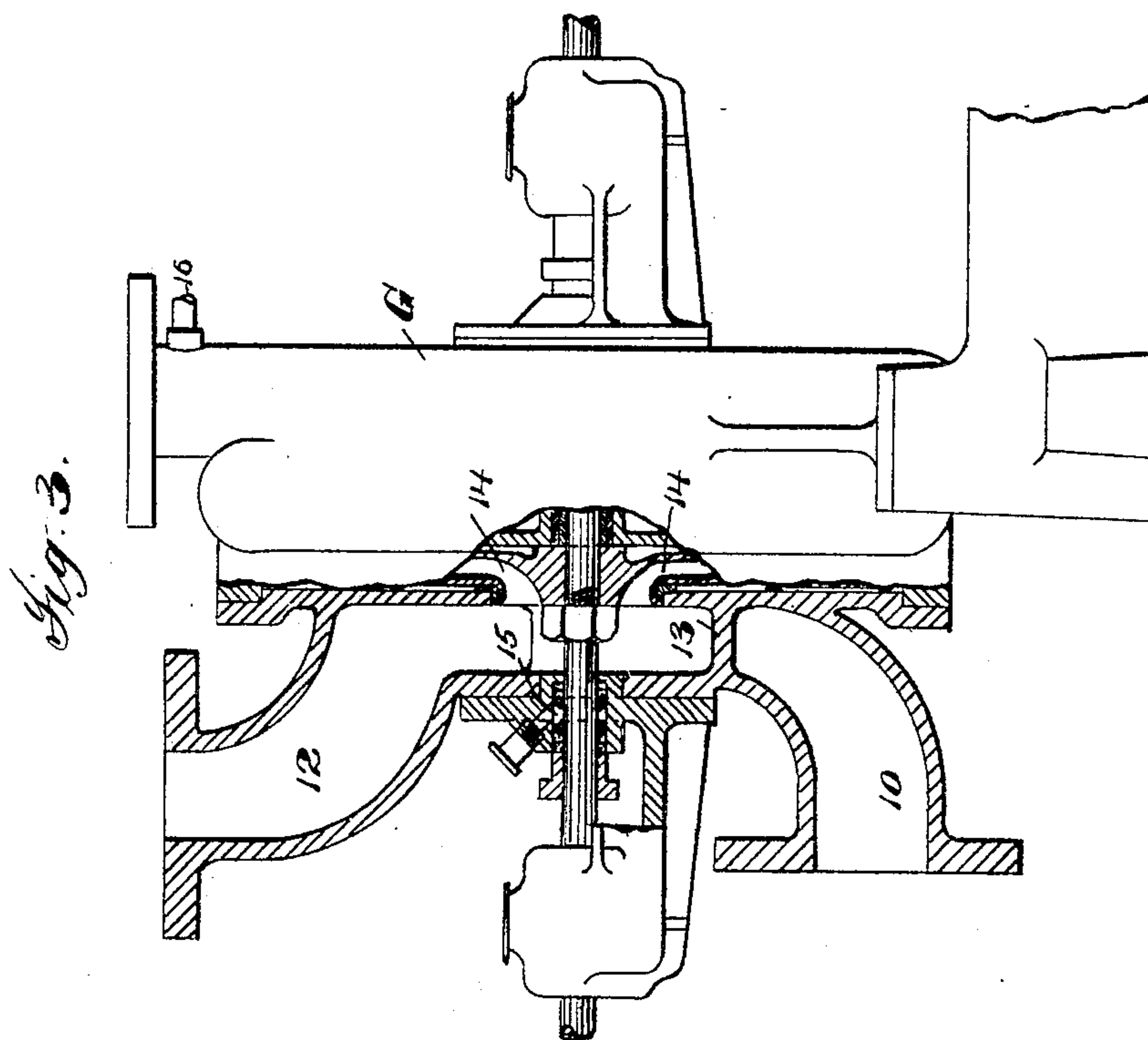
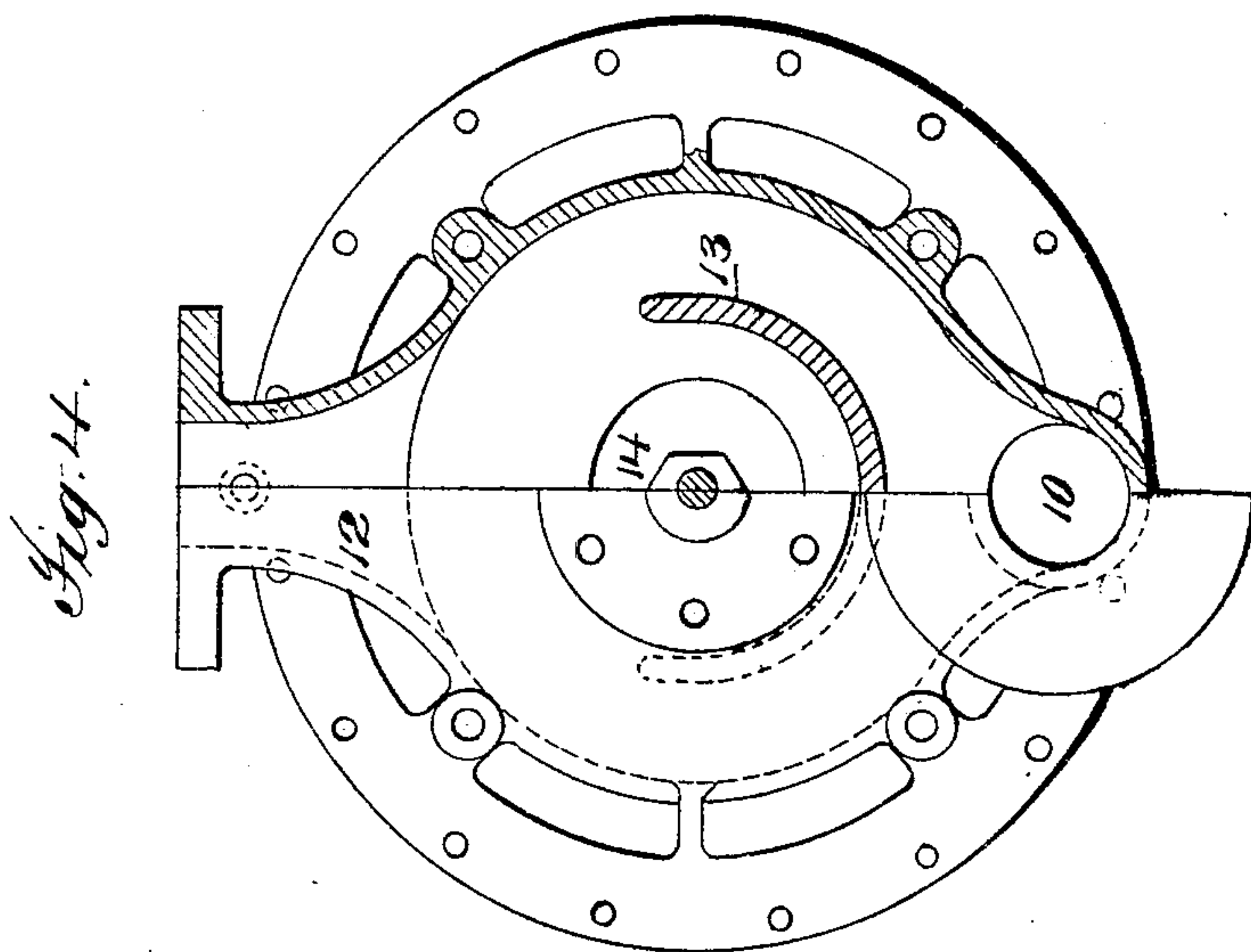


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2 SHEETS—SHEET 2.



Witnesses
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UNITED STATES PATENT OFFICE.

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CONDENSER SYSTEM.

No. 803,787.

Specification of Letters Patent.

Patented Nov. 7, 1905.

Application filed August 6, 1904. Serial No. 219,698.

To all whom it may concern:

Be it known that I, FREDERICK RAY, a citizen of the United States, residing at East Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Condenser Systems, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to an improved condenser system of that class employing a condenser in combination with a centrifugal or turbine pump for removing the discharge-water.

In such condenser systems it is found in practice that under certain conditions of piping not providing for a free escape of the air from the discharge-water such air may collect on the suction side of the centrifugal or turbine pump so as to interfere with the suction. One object of the present invention is to provide simple and efficient means for avoiding this difficulty under all conditions of piping. It is found also that in some cases air may collect on the delivery side of the centrifugal pump in case the pump should withdraw all the water from the hot-well, and I preferably provide for drawing off any such air collected on the delivery side.

The invention includes in addition to the above features a special construction of pump-suction designed to aid in securing the removal of air or vapor from the suction liquid of a centrifugal or turbine condenser discharge-pump and certain combinations of parts in a complete condenser system of the class above referred to, all of which will be fully described hereinafter and specifically pointed out in the claims.

While the broader features of the invention are applicable to systems employing condensers of all classes in which air or uncondensed vapors are liable to pass to the pump-suction with the discharge-water, the invention is especially applicable to condenser systems of that class employing a surface condenser, such a system being shown and described in United States Letters Patent No. 725,212, dated April 14, 1903, and certain combinations limited to such a system form part of the invention.

In the accompanying drawings, which show a surface condenser system and cen-

trifugal or turbine pump embodying all the features of the invention in their complete and preferred form, Figure 1 is a diagrammatic side elevation. Fig. 2 is an end view of the same. Fig. 3 is an enlarged view of the centrifugal pump, partly in section to show the suction construction. Fig. 4 is an end view in section looking toward the suction end of the pump.

Referring to said drawings, A is the condenser, which is shown as a horizontal condenser, having the inlet B for the exhaust-steam, inlet C and outlet D for the condensing-water, and receiver E at the bottom of the condenser for the water of condensation, which receiver E is connected at the bottom by tail-pipe F to the suction of the centrifugal pump G, by which the water of condensation is delivered through pipe H to the hot-well. The receiver E is entered above the outlet to tail-pipe F by air-pipe I, through which the air and uncondensed vapors from the upper part of the receiver H and bottom of the condenser A pass through air-cooler or supplementary condenser K and thence through a continuation of air-pipe I to the air-pump. This air-cooler or supplementary condenser K is cooled by the incoming condensing-water from inlet C, and a drain-pipe L, preferably trapped, as shown, is used to carry off any condensation in the cooler and deliver it to the receiver E with the water of condensation. The construction thus far described is old, and all the parts may be of any other common or suitable construction.

Referring now to the parts relating especially to the present invention, the centrifugal pump G has its suction-pipe 10 connected to the pipe F, as described above, and its suction is also connected by pipe 11 to some part of the air system, preferably to the air-pipe I, as shown, so that any air separated from the water of condensation on the suction side of the centrifugal pump will be removed by the air-pump. This air-pipe 11 may connect with the suction of the pump in any suitable manner or with the pipe F near the centrifugal pump within the broader features of the invention; but I preferably use a special construction of centrifugal pump-suction by which the air is separated from the suction-water and more efficiently removed. In this construction, which is shown in detail in Figs.

3 and 4, the suction-chamber of the pump has at the bottom the suction-elbow 10 and at the top a special elbow 12, with which the pipe 11 connects, and within the suction-chamber above the elbow 10 is a curved baffle-plate 13, which divides the suction-water, so that it passes upward on each side of the baffle-plate and then to the impeller through the usual suction-passage 14. The water is thus broken up by the baffle-plate 13, so as to free the air therefrom, the air passing upward and out through the elbow 12. In order to assure the pump against the leakage of air into the suction from the atmosphere, a liquid or equivalent packing 15 is preferably used on the suction side.

On the delivery side an air-pipe 16 is preferably used, which connects the delivery with the air pipe I, this air-pipe 16 being preferably provided with a cock 1, which may be opened when desired for the removal of possible collection of air on the delivery side of the pump. The delivery-pipe H is also preferably provided with a check-valve 2 for retaining a certain amount of water on the delivery side to seal the pump.

It will be understood that the invention is not limited to a condenser system employing all the features of that shown, but that it is applicable also to less complete condenser systems and, broadly considered, to condenser systems of other classes, including injection or jet condenser systems.

It will be understood also that the invention is not limited to the special form or construction of the parts shown, but that the form and arrangement of the parts may be varied widely without departing from the invention as defined by the claims.

What I claim is—

1. The combination with a condenser, of a centrifugal or turbine discharge-pump connected to said condenser and means for removing air from the pump-suction.

2. The combination with a condenser, of a centrifugal or turbine discharge-pump connected to said condenser, an air-pump, and an air-pipe connecting the centrifugal or turbine pump-suction with the air-pump.

3. The combination with a condenser and an air-pump for removing air from the condenser separately from the discharge-water, of a centrifugal or turbine discharge-pump connected to the condenser, and an air-pipe connecting the centrifugal or turbine pump-suction with the air-pump.

4. The combination with a surface condenser, of a centrifugal or turbine pump connected to said condenser for withdrawing the condensed water, and means for removing air from the pump-suction.

5. The combination with a surface condenser, of a centrifugal or turbine pump connected to said condenser for withdrawing the condensed water, an air-pump, and an air-

pipe connecting the centrifugal or turbine pump-suction with the air-pump.

6. The combination with a surface condenser, of an air-pump connected to said condenser for withdrawing air separately from the condensed water, a centrifugal or turbine pump connected to the condenser for withdrawing the condensed water, and an air-pipe connecting the centrifugal or turbine pump-suction with the air-pump.

7. The combination with a surface condenser, of an air-pump connected to said condenser for withdrawing air separately from the condensed water, an air-cooler or supplementary condenser through which the air passes on its way to the air-pump, a centrifugal or turbine pump connected to the condenser for withdrawing the condensed water, and an air-pipe connecting the centrifugal or turbine pump-suction with the air-pump.

8. The combination with a condenser, of a centrifugal or turbine discharge-pump connected to said condenser, and an air-pipe connected to the pump-delivery for withdrawing air collected on the delivery side of the pump.

9. The combination with a condenser, of a centrifugal or turbine discharge-pump connected to said condenser, an air-pipe for withdrawing air from the pump-suction, and an air-pipe for removing air collected on the delivery side of the pump.

10. The combination with a condenser, of a centrifugal or turbine discharge-pump connected to said condenser, an air-pump, and air-pipes connecting the centrifugal or turbine pump suction and delivery with the air-pump for withdrawing air from the pump-suction and removing air collected on the delivery side of the pump.

11. The combination with a condenser, of an air-pump for removing air from the condenser separately from the condensed water, a centrifugal or turbine discharge-pump connected to said condenser, an air-pump, and air-pipes connecting the centrifugal or turbine pump suction and delivery with the air-pump for withdrawing air from the pump-suction and removing air collected on the delivery side of the pump.

12. The combination with a condenser, of a centrifugal or turbine discharge-pump connected to said condenser, a baffle in the pump-suction, an air-passage from the pump-suction above the baffle for the escape of air from the pump-suction, and an air-pump connected to said passage.

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

FREDERICK RAY.

Witnesses:

W. H. KENNEDY,
C. J. SAWYER.