

No. 725,212.

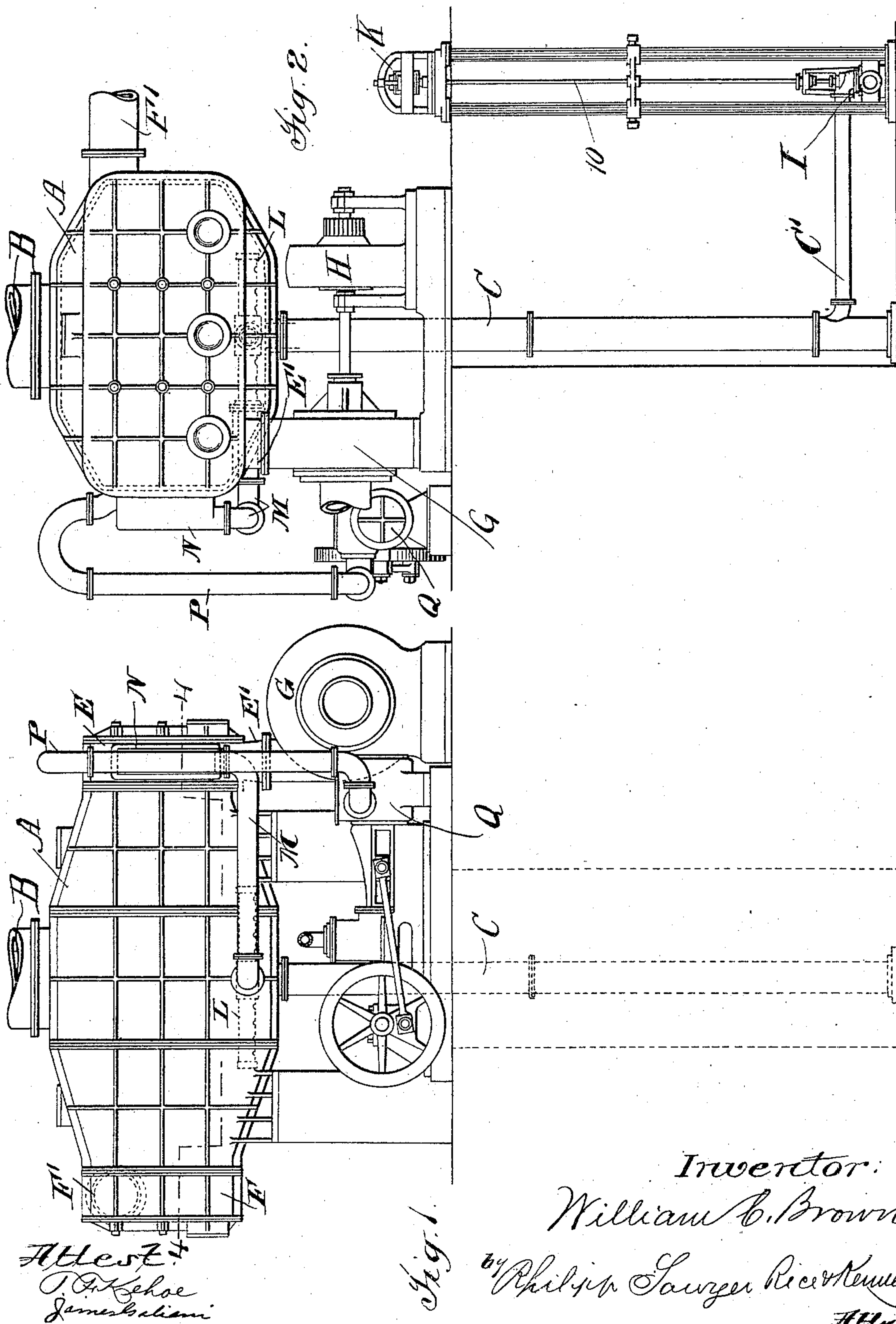
PATENTED APR. 14, 1903.

W. C. BROWN.
CONDENSER SYSTEM.

APPLICATION FILED APR. 26, 1902.

NO MODEL.

3 SHEETS—SHEET 1.



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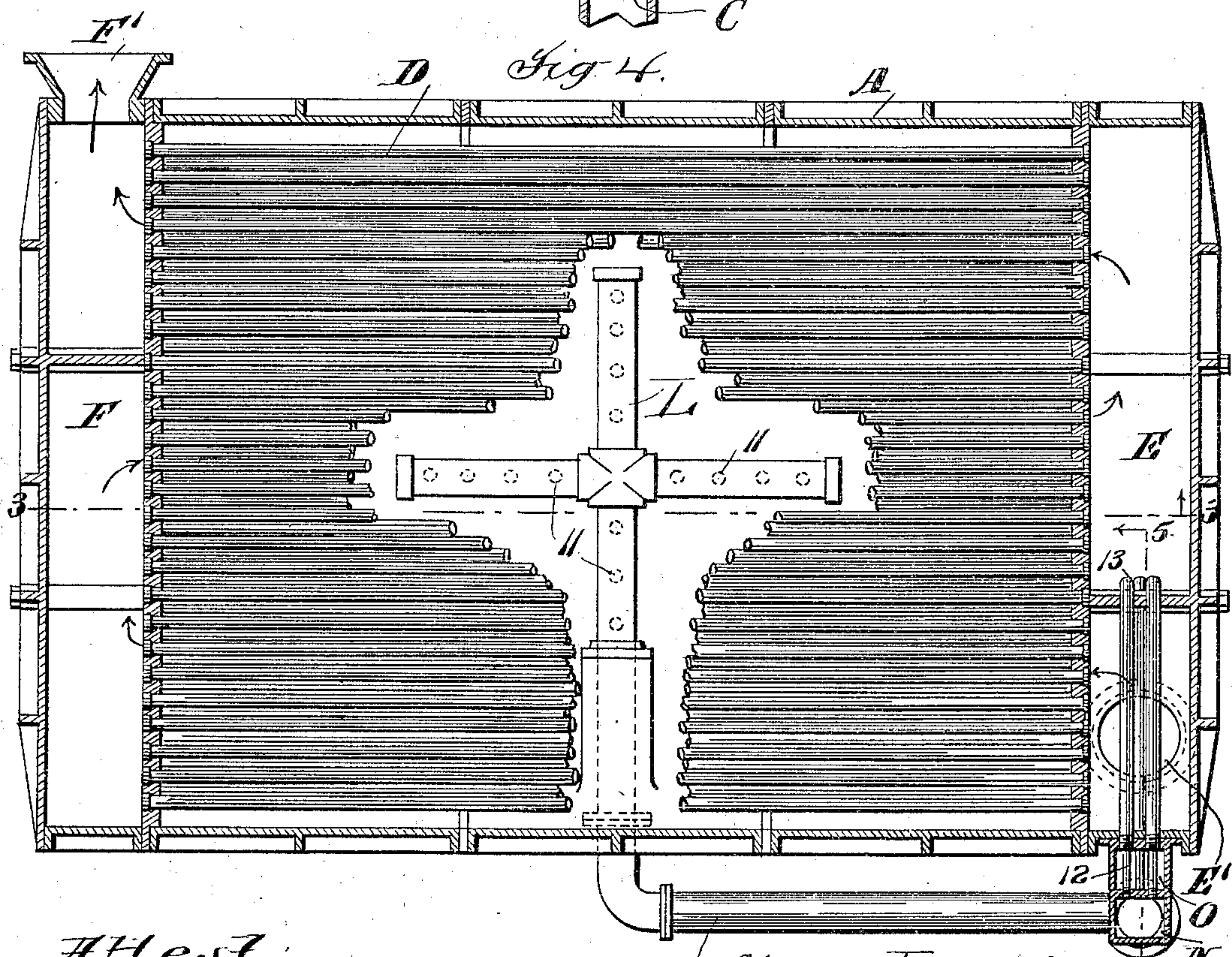
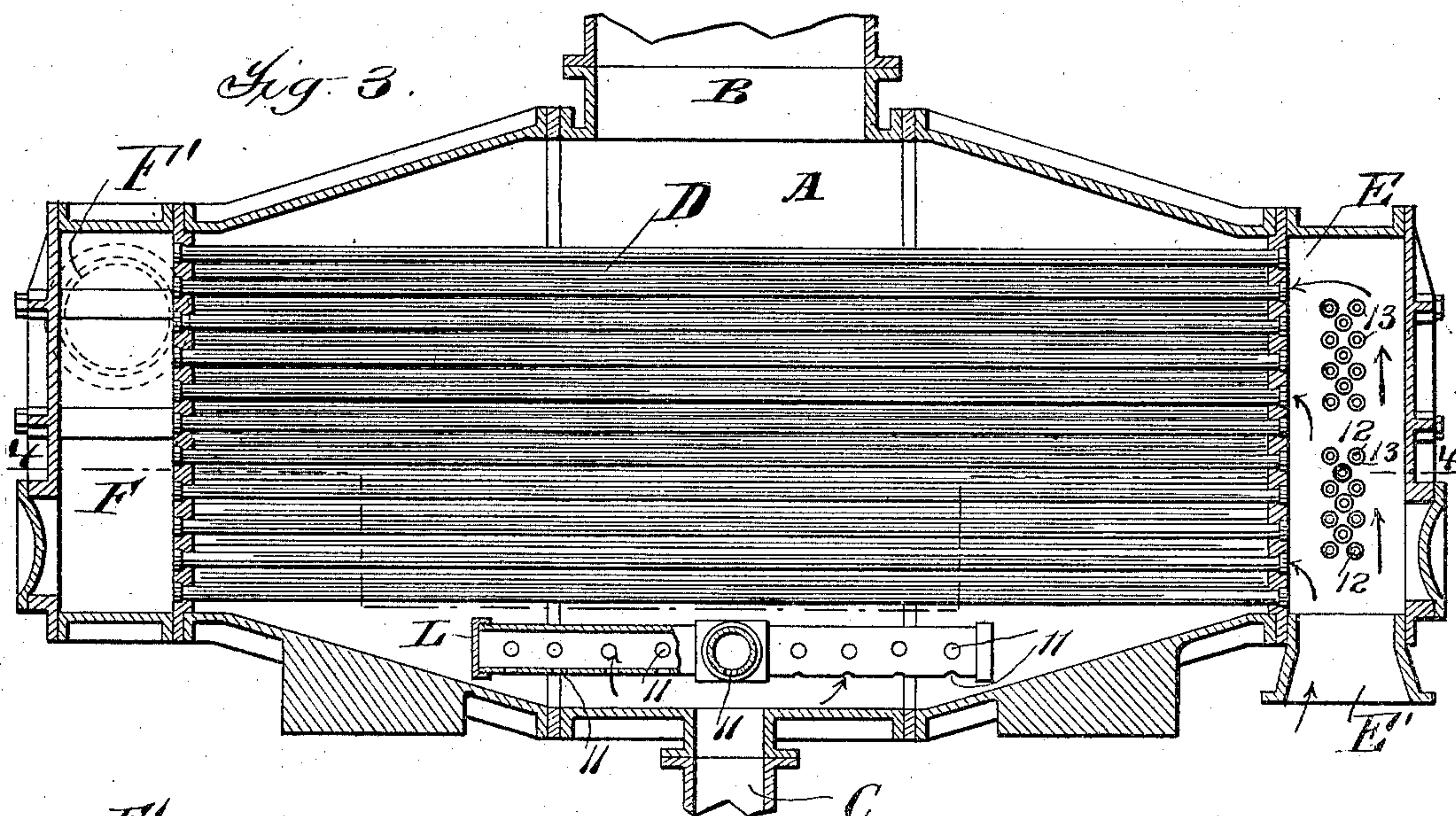
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3 SHEETS—SHEET 2.



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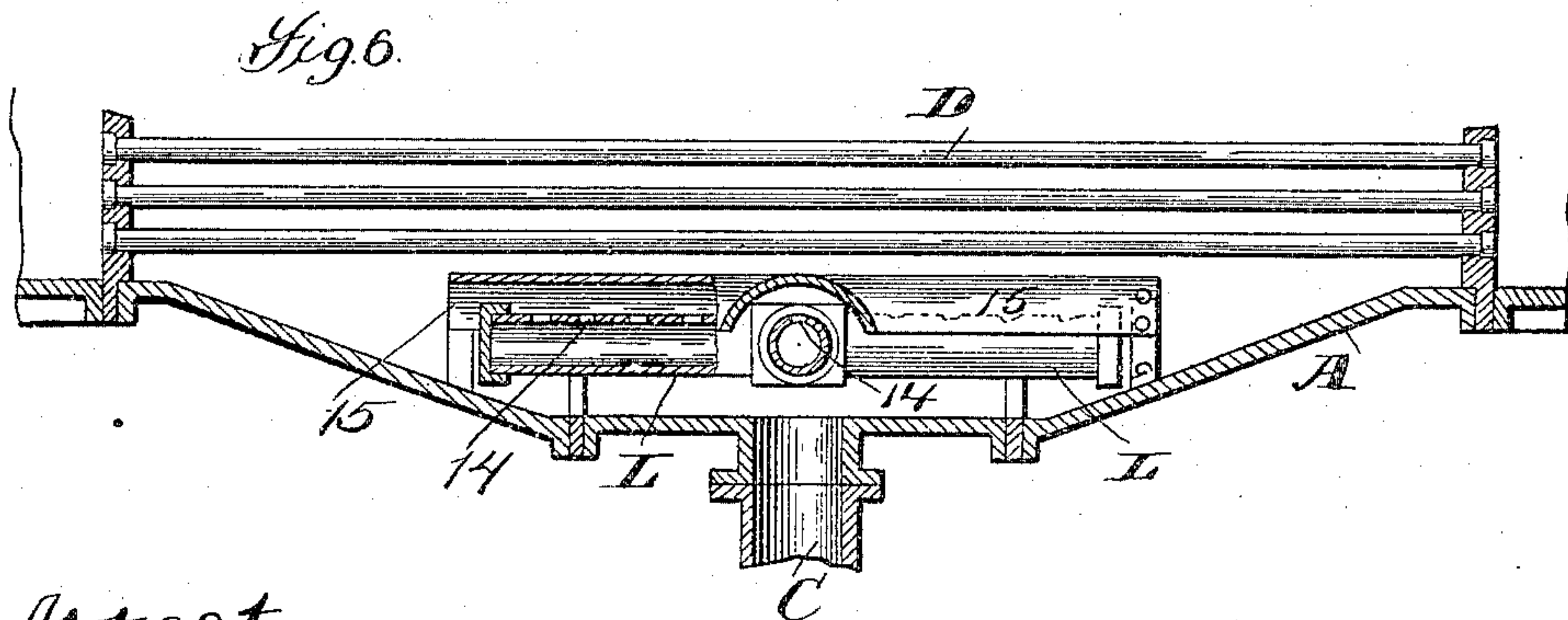
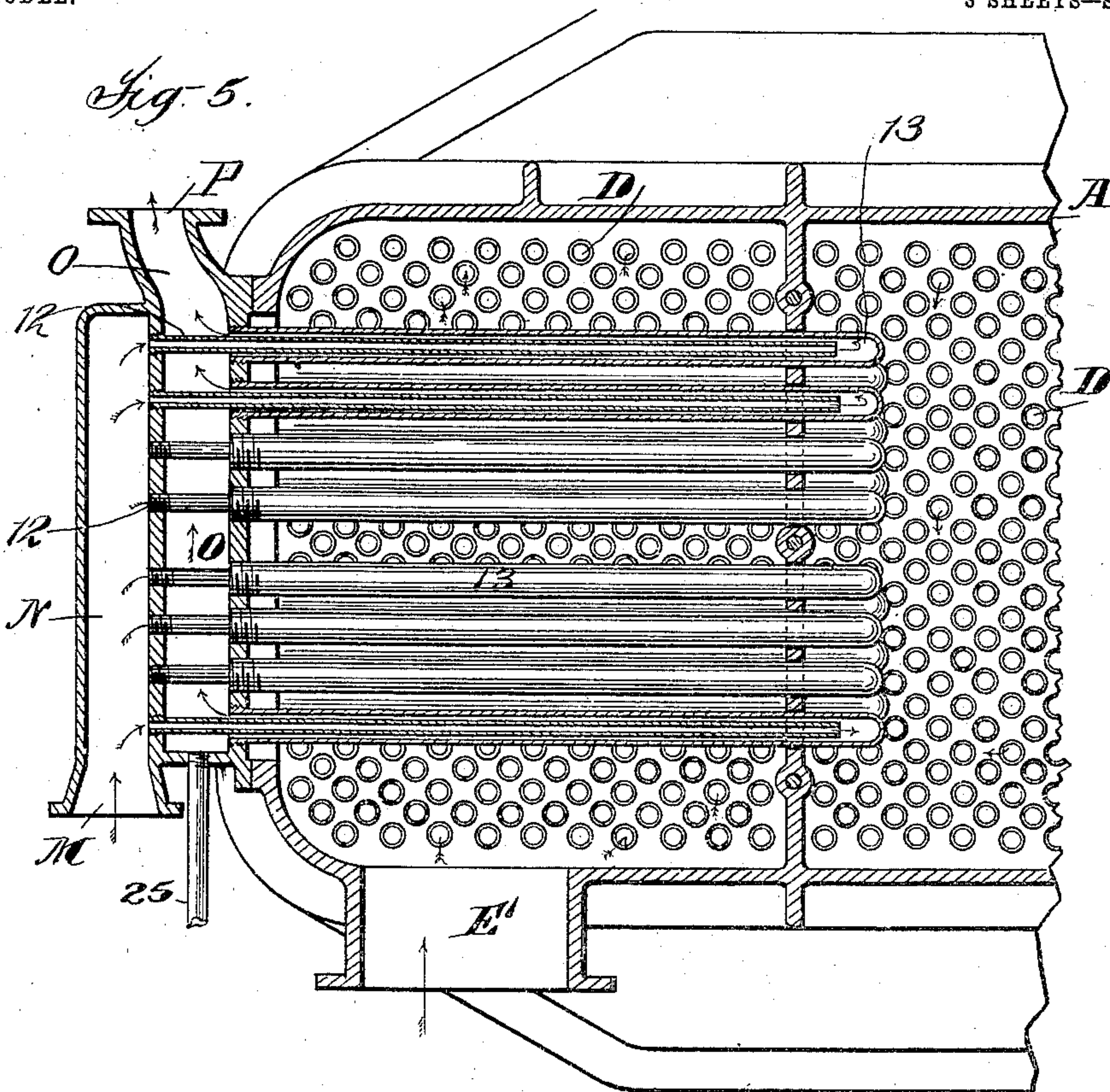
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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

CONDENSER SYSTEM.

SPECIFICATION forming part of Letters Patent No. 725,212, dated April 14, 1903.

Application filed April 26, 1902. Serial No. 104,805. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM C. BROWN, a citizen of the United States, residing in the borough of Richmond, city of New York, county of Richmond, and State of New York, 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.

The object of the present invention is to provide an improved condenser system of that class employing surface condensers, and especially to provide a construction for efficiently separating the air and other uncondensable vapors from the water and delivering them from the system.

A further object of the invention is to provide an apparatus in which the water of condensation is efficiently removed from the surface condenser whatever be the variation in amount of water flowing from the condenser.

The following are the two broader features of the invention: the combination, with a surface condenser and air-pump, of an air-cooler arranged so that the air passes through the cooler on its way to the air-pump, and the air is thus cooled and any condensable vapors therein condensed, the cooler being preferably inserted with the circulating-head of the condenser, so as to be cooled by the circulating water, and the combination, with a surface condenser, of a centrifugal or turbine pump for removing the water of condensation, so that the delivery of the pump will vary with the amount of water passing from the condenser and even a very small flow from the condenser be taken care of by a pump running at a constant speed without any float-valve or other special control or regulating apparatus.

The invention includes also various features of construction and combinations of parts in condenser systems, all as more fully described hereinafter and particularly pointed out in the claims.

In the accompanying drawings, in which all the features of the invention are shown as applied in a simple preferred form, Figure 1 is a side elevation of the condenser system. Fig. 2 is an end elevation of the same. Fig. 3 is a

longitudinal central section on line 3 of Fig. 4. Fig. 4 is a horizontal section on the line 4 of Fig. 3. Fig. 5 is a cross-section on the line 5 of Fig. 4. Fig. 6 is a detail showing a modified form of device for taking the air from the condenser.

Referring now particularly to the construction shown in Figs. 1 to 5, A is the condenser, which is shown as a horizontal condenser, having the inlet B at the top for the exhaust-steam and the usual vertical tail-pipe C, opening from the bottom of the condenser for the water of condensation. The condenser has the tubes D for the circulating or condensing water, which tubes open at opposite ends into the inlet-chamber E and outlet-chamber F for the circulating or condensing water, with which, respectively, connect the inlet and outlet pipes E' F'. The inlet-pipe E' for the circulating water connects with the pump G, by which the condensing water is forced through the condenser, this pump being shown as a centrifugal or turbine pump operated by the motor H. The tail-pipe C, through which the water of condensation passes from the condenser, is shown as extending downward into the pit below the condenser, as usual in this class of apparatus, and is connected by pipe C' to the centrifugal or turbine pump I, which is shown as actuated by the long shaft 10 from the motor K, placed on the same level as the motor H. It will be understood, however, that the means by which the pump I is actuated and its connections with the condenser are not important so long as the water of condensation is delivered by a centrifugal or turbine arranged so as to secure the results of the invention.

Referring now to the devices for removing the air from the condenser and cooling it, the air is collected from the condenser by a pipe L in the lower part of the condenser, provided with small openings 11, through which the air enters, this pipe being shown in the form of a cross extending well over the bottom of the condenser, and the pipe L is connected by pipe M to the chamber N at the end of the condenser from which the air passes to the air-cooler. This air-cooler may consist of tubes running through the condenser-head from one side to the other; but preferably I

use the construction shown, in which inner and outer pipes 12 13 in the circulating-water chamber E are arranged so that the air passes from chamber N through the tubes 12 and then returns through tubes 13 into chamber O at the same side of the condenser as chamber N, with which chamber O connects the air-pipe P, forming the suction-pipe of the air-pump Q, which is shown as a common crank-driven plunger-pump. The chamber O and pipes 12 13 form not only an air-cooler and supplementary condenser, but also a separator for separating any condensed liquid from the air, any such liquid passing into the bottom of chamber O and through pipe 25 to the hot-well or elsewhere. If desired, of course, a liquid-separator distinct from the cooler may be put on; but the construction shown is efficient.

The construction shown in Fig. 6 is or may be substantially the same as that above described, except that the pipe L for collecting the air from the bottom of the condenser is provided with openings 14 on its upper side, and this pipe is covered by a hood 15, which prevents the water passing into the pipe from above as it condenses in the upper part of the condenser. The form of the bottom of the condenser is such that the condensing water flows from the condenser into the tail-pipe without permitting the collection of water in the condenser to a depth above the pipe 14, so that the air-pipe is kept clear from condensed water, except as water-vapor may pass through the air-pipe with the air.

The cooling of the air and the condensation of any condensable vapors therein on their way from the condenser to the air-pump secure a much more efficient action of the condenser system and of the air-pump. The removal of the water of condensation by the centrifugal pump or turbine secures the efficient delivery of varying amounts of water by a pump run at a constant speed and retains even the smallest amount of water, so as to keep the condenser clear, and this is important also in securing an efficient and economical operation of the system.

While the air-cooler is preferably placed within the condenser or condenser-head, so as to be cooled by the incoming condensing water, it will be understood that the air-cooler may be otherwise arranged and cooled and that the invention is not to be limited to the special form of apparatus shown as embodying the invention, as this may be varied widely while retaining the features claimed.

What I claim is—

1. In a condensing system, the combination with a surface condenser and an air-pump for removing air therefrom separately from the water of condensation, of an air-cooler through which the air passes on its way from the condenser to the air-pump, substantially as described.

2. In a condensing system, the combination with a surface condenser and an air-pump for

removing air therefrom separately from the water of condensation, of means for cooling the air and removing condensed liquid therefrom on its way to the air-pump, including an air-cooler through which the air passes on its way from the condenser to the air-pump, substantially as described.

3. In a condensing system, the combination with a surface condenser and an air-pump for removing air therefrom separately from the water of condensation, of means for cooling the air and removing condensed liquid therefrom on its way to the air-pump, including an air-cooler and liquid-separator through which the air passes on its way to the air-pump, substantially as described.

4. In a condensing system, the combination with a surface condenser and an air-pump for removing air therefrom separately from the water of condensation, of an air-cooler cooled by the condensing water and through which the air passes on its way from the condenser to the air-pump, substantially as described.

5. In a condensing system, the combination with a surface condenser and an air-pump for removing air therefrom separately from the water of condensation, of an air-cooler arranged in the condenser-head and cooled by the incoming condensing water and through which the air passes on its way from the condenser to the air-pump, substantially as described.

6. In a condensing system, the combination with a surface condenser, of an air-pipe extending across the condenser near the bottom and provided with openings for the admission of air, an air-pump connected with said pipe, and an air-cooler through which the air passes on its way to the air-pump, substantially as described.

7. In a condensing system, the combination with a surface condenser, of an air-pipe extending across the condenser near the bottom and provided with openings for the admission of air, an air-pump connected with said pipe, and an air-cooler arranged in the condenser-head and cooled by the incoming condensing water and through which the air passes on its way to the air-pump, substantially as described.

8. In a condensing system, the combination with a surface condenser, of an air-pipe extending across the condenser near the bottom and provided with openings on its upper side for the admission of air, and a hood over said air-pipe, an air-pump connected with said pipe, and an air-cooler through which the air passes on its way to the air-pump, substantially as described.

9. The combination with a surface condenser, of a centrifugal or turbine pump connected to said condenser for withdrawing the condensed water, substantially as described.

10. The combination with the surface condenser A having the inlet-chamber E for the condensing water, of air-chamber N on the condenser end, pipe M connecting the air-

chamber with the condenser for the removal of air from the latter, delivery air-chamber O, pipes connecting chambers N, O and extending within the chamber E for cooling by the condensing water, and an air-pump connected with chamber O, substantially as described.

11. The combination with the surface condenser A having the inlet-chamber E for the condensing water, of air-chamber N on the condenser end, pipe M connecting the air-chamber with the condenser for the removal of air from the latter, delivery air-chamber O, pipes connecting chambers N, O and extending within the chamber E for cooling by the condensing water, an air-pump connected with chamber O, and pipe 25 from said chamber O, substantially as described.

12. The combination with condenser A having the sloping bottom and delivery-pipe C, of air-pipe M in the lower part of the condenser having openings for the admission of air, substantially as described.

13. The combination with condenser A having the sloping bottom and delivery-pipe C, of air-pipe M in the lower part of the condenser having openings 14 on its upper side for the admission of air, and hood 15 over the air-pipe, substantially as described.

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

WILLIAM C. BROWN.

Witnesses:

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