

(No Model.)

3 Sheets—Sheet 1.

E. ROWE.

STEAM CONDENSER AND OIL SEPARATOR.

No. 538,600.

Patented Apr. 30, 1895.

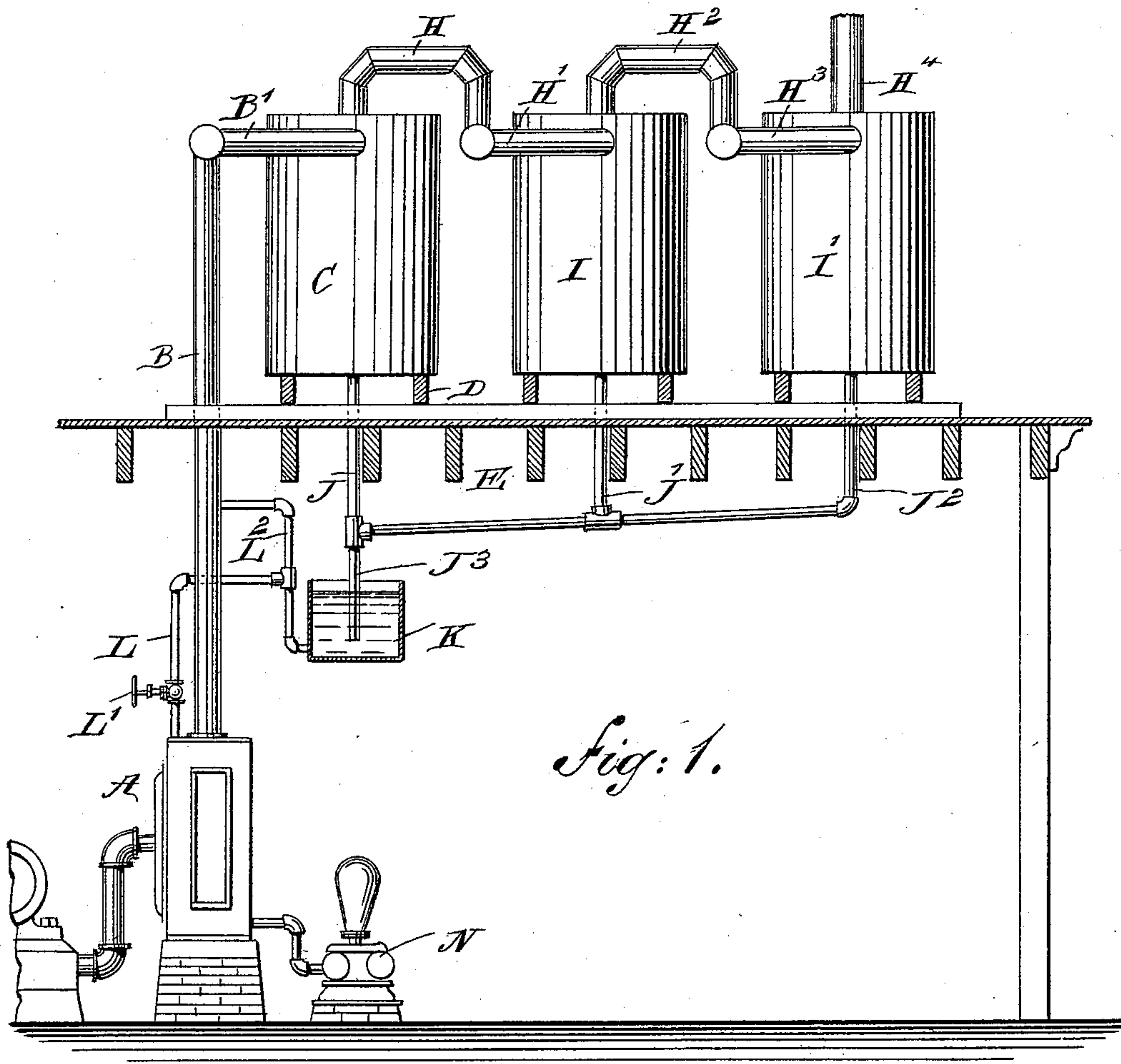
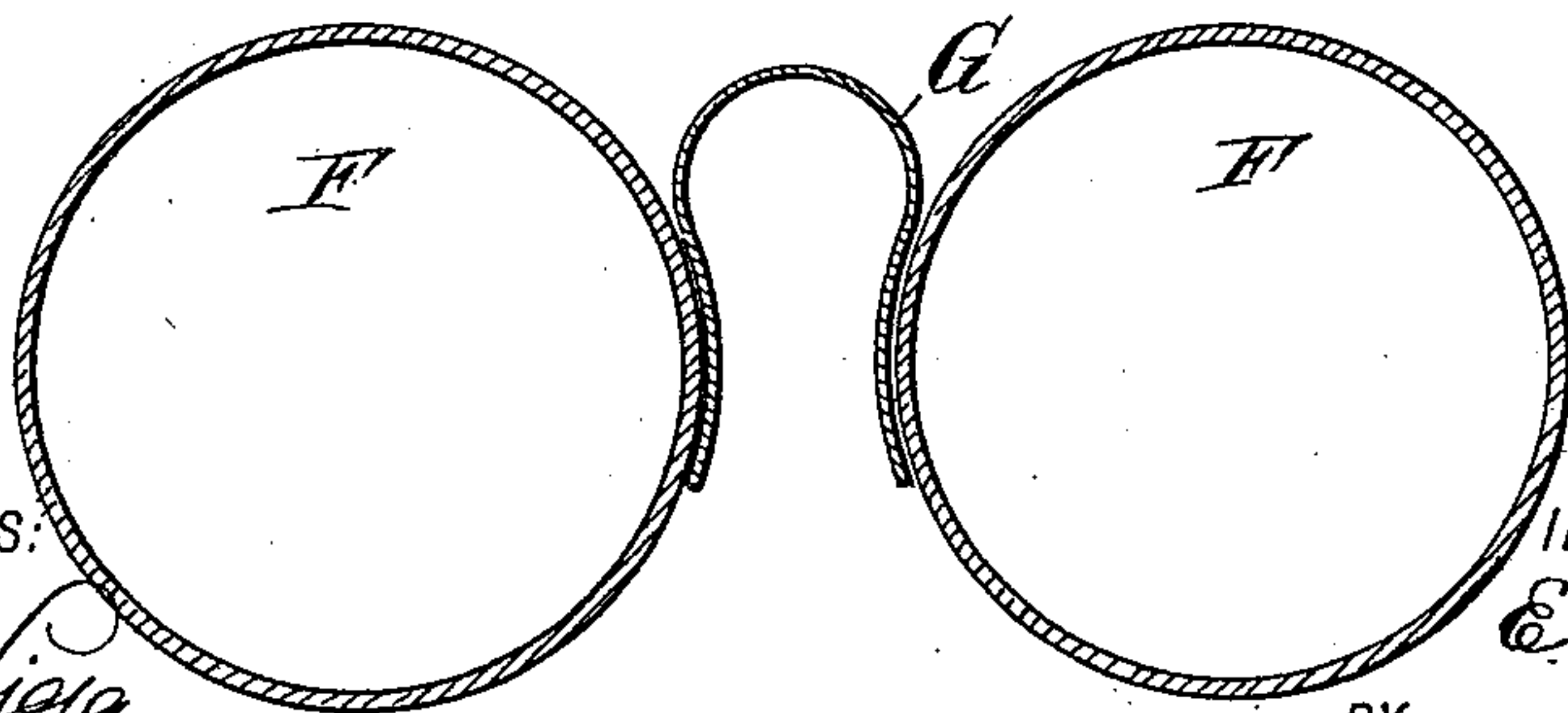


Fig: 1.

Fig: 4.



WITNESSES:

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Fig. 2.

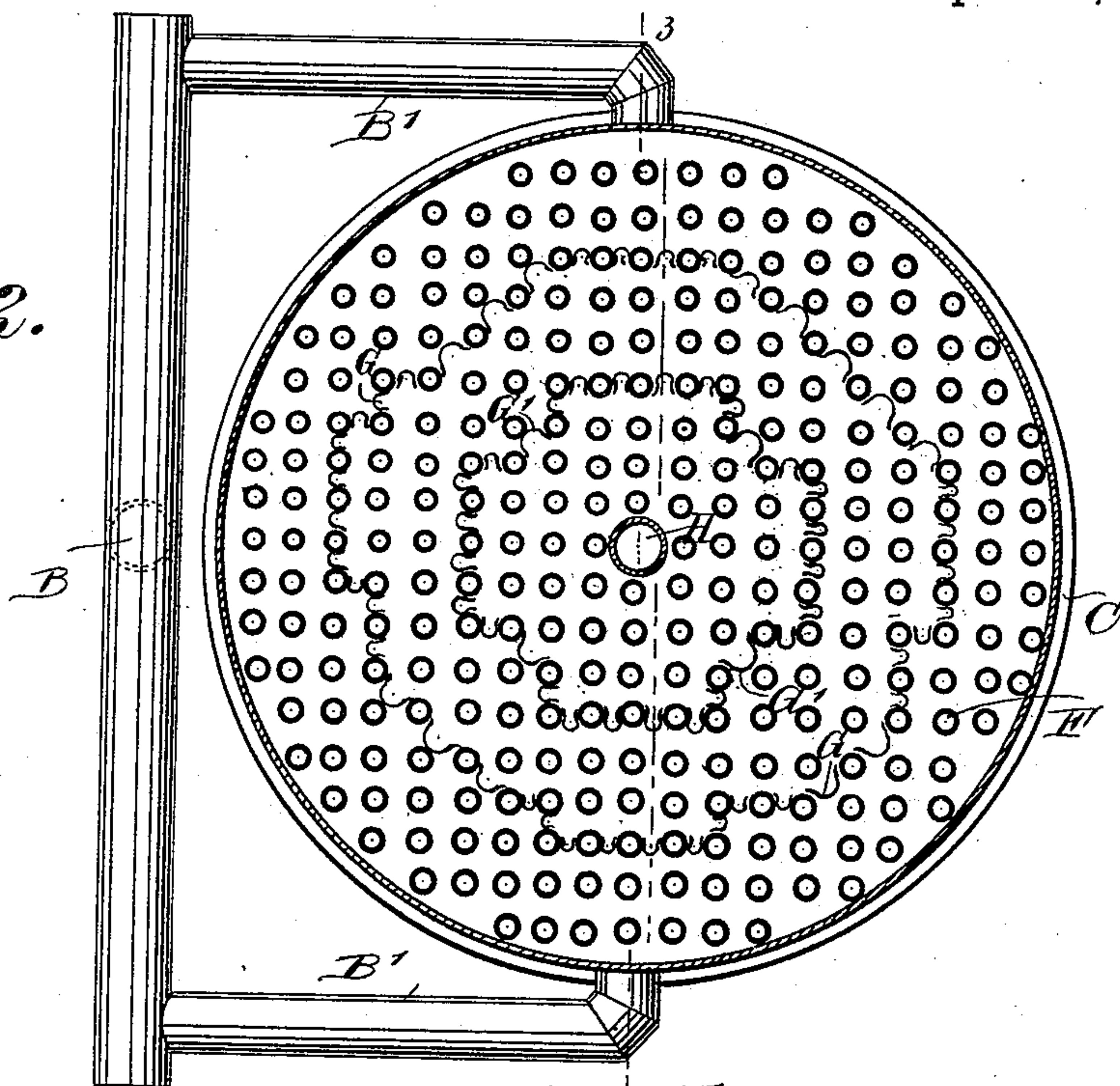
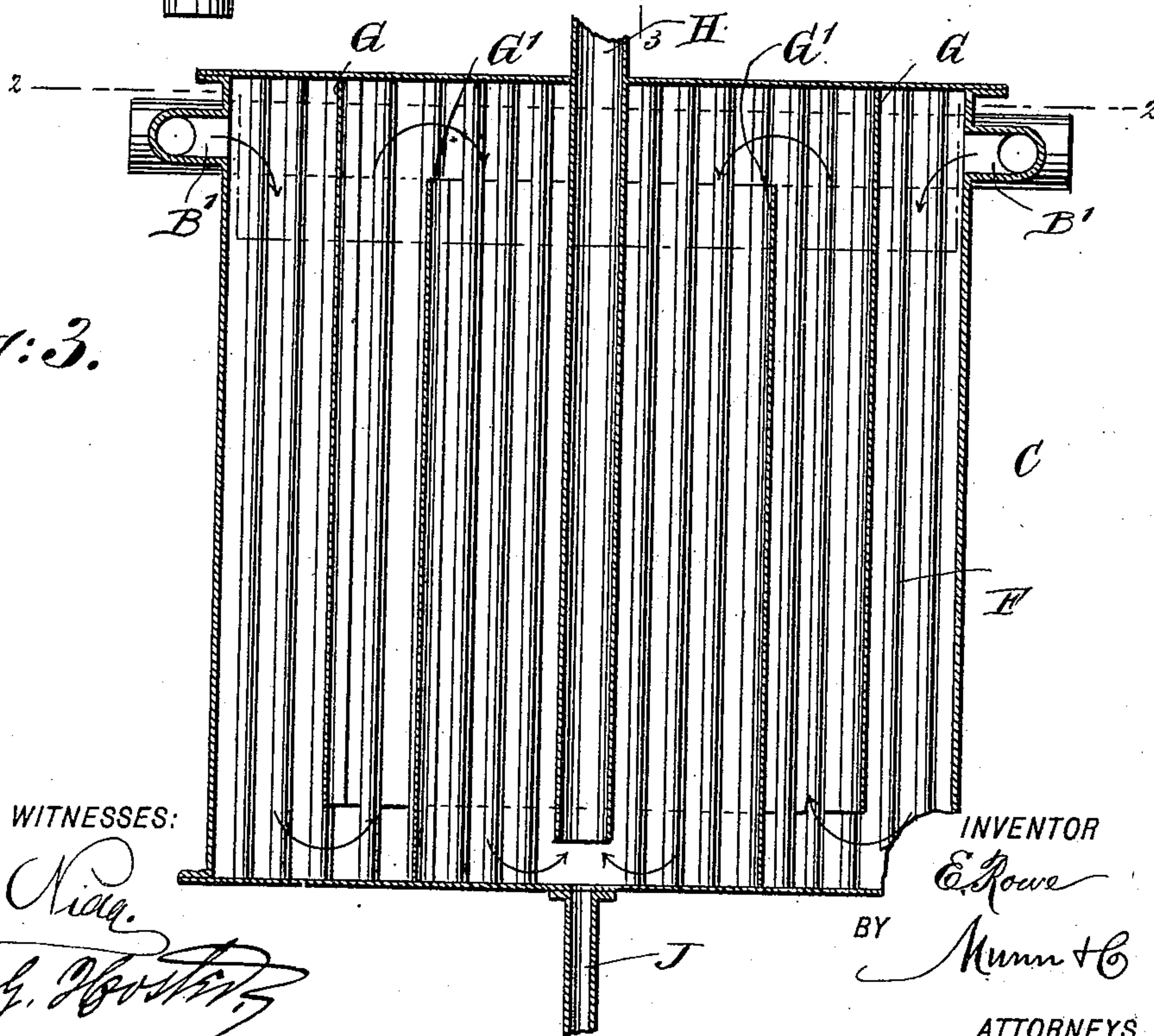


Fig. 3.



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3 Sheets—Sheet 3.

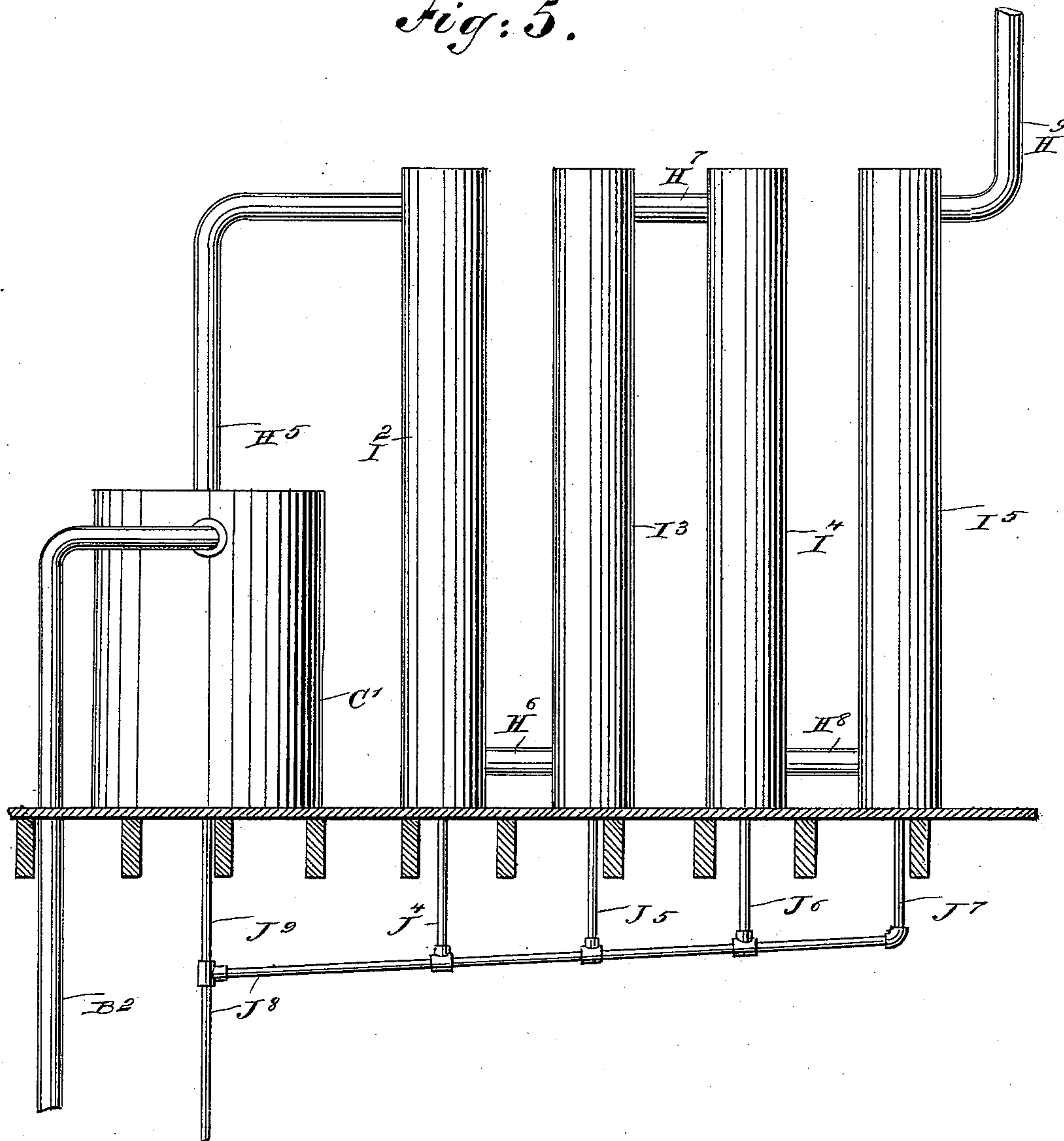
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Fig: 5.



WITNESSES:

WITNESSES:
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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

EDWARD ROWE, OF INDIANA, PENNSYLVANIA.

STEAM-CONDENSER AND OIL-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 538,600, dated April 30, 1895.

Application filed June 13, 1894. Serial No. 514,402. (No model.)

To all whom it may concern:

Be it known that I, EDWARD ROWE, of Indiana, in the county of Indiana and State of Pennsylvania, have invented a new and Improved Steam-Condenser and Oil-Separator, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved steam condenser and oil separator, which is comparatively simple and durable in construction, very effective in operation, and more especially designed for condensing exhaust steam from engines or other apparatus, and to return the water of condensation to the feed pump or other device, at the same time purifying the water to prevent incrustation of the boiler.

The invention consists principally in a series of connected vessels, of which the first receives the steam, and each vessel is provided with air tubes for the circulation of air, to condense the steam circulating in the vessel.

The invention also consists in certain parts and details, and combinations of the same, as will be hereinafter fully described and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the improvement with parts in section. Fig. 2 is an enlarged sectional plan view of one of the condensing-vessels on the line 2 2 of Fig. 3. Fig. 3 is a transverse section of the same on the line 3 3 of Fig. 2. Fig. 4 is an enlarged sectional plan view of two air-tubes with a baffle-plate between them, and Fig. 5 is a side elevation of a modified form of the improvement.

The improved condenser as illustrated in Figs. 1 to 4 receives the steam from an engine A, or other apparatus, by means of an exhaust pipe B extending upwardly and provided at its upper end with two or more branch pipes B', discharging into the upper end of a condensing vessel C, preferably made circular in form and resting on beams D, set on a floor E or other support. This condensing vessel C is provided with a series of vertically disposed air tubes F, passing through the heads of the condensing vessel C, to permit air to freely circulate through the said tubes.

Between adjacent air tubes F are held baffle plates G, G', arranged in such a manner that one outer set G, of the baffle plates, as illustrated in Fig. 2, extends from the upper head of the vessel C to within a short distance of the lower head, while the inner set of baffle plates G' extends from the bottom head upwardly to within a short distance of the upper head of the said condensing vessel. See Fig. 3. By this arrangement, the steam entering the branch pipes B' at the top of the vessel C, is first forced to pass downward between the shell of the condensing vessel and the first set of baffle plates G, and then the steam passes between the two sets of baffle plates G and G', to finally pass into the middle portion of the condenser, and downward to the lower end of a pipe H, extending through the upper head of the condensing vessel to within a short distance of the bottom thereof, as plainly indicated in Fig. 3. The steam now passes up this pipe H, and out of the condensing vessel C.

The outer end of the pipe H is bent downward to connect by branch pipes H' with a second condensing vessel I, similar in construction to the vessel C, and also provided with a steam outlet pipe H², connected by branch pipes H³ with a third condensing vessel I', similar to the vessels I and C. The outlet pipe H⁴ of this vessel I' may connect with a fourth condensing vessel, or may open into the outer air.

In the lower head or bottom of each vessel C, I or I', are arranged water outlet pipes J, J' or J² discharging into a common pipe J³, extending to within a short distance of the bottom of a grease tank K, in which the water of condensation accumulates, and from which grease or other impurities may be skimmed off from time to time. From the bottom of this tank K leads a water outlet pipe L, provided with a valve L', and connected with a feed pump N or other device for returning the water to the boiler or other apparatus. An air pipe L² in the upper end of the pipe L prevents siphoning of water from the grease tank K, by the pipe L.

It will be seen that when the air circulates through the air tubes F and the steam circulates in each condensing vessel around the said air tubes, then the steam readily condenses, and the water of condensation flows

through the water outlet pipe J, J' or J² to the grease tank K, in which it accumulates. As the condensing vessels C, I and I' are comparatively large, the steam can readily pass
5 through the same without creating back pressure. It will further be understood that by the arrangement described, no water jackets or other water circulating devices are necessary to condense the steam, it being under-
10 stood that the condensing is brought about by circulating air through the air tubes in the condensing vessels.

In the apparatus shown in Fig. 5, the exhaust steam from the engine or other apparatus passes through the pipe B² into and through a condensing vessel C' similar in construction to the vessel C above described and illustrated in Figs. 1, 2 and 3. The steam outlet pipe H⁵ of this condensing vessel C' connects with the upper end of the condensing vessel I², made comparatively high and of a small diameter, with air pipes passing through the vessel and its heads to permit a circulation of air through the pipes to con-
25 dense the steam passing through the vessel I². The latter is connected at or near its bottom by a branch pipe H⁶ with a second vessel I³, similar to the vessel I² and connected at its upper end by a branch pipe H⁷ with the upper end of another condensing vessel I⁴, connected at its lower end, by the branch pipe H⁸ with a condensing vessel I⁵, provided at its upper end with an outlet pipe H⁹ for vapors not condensed. The several vessels I³, I⁴ and I⁵ are
35 all similar in construction to the vessel I² and their bottoms are connected by pipes J⁴, J⁵, J⁶ and J⁷ with a pipe J⁸ leading to an oil separator similar to the one above described and shown in Fig. 1. A pipe J⁹ connects the vessel C' with the pipe J⁸ and this pipe J⁹ as well as the pipes J⁴, J⁵, J⁶ and J⁷ serves to carry the water of condensation for the vessels C', I², I³, I⁴ and I⁵ to the oil separator. It is understood that any desired number of such ves-
45 sels I², I³, I⁴ and I⁵ may be connected with each other alternately at the top and bottom as described. The air passing through the air pipes in the said vessels causes a condensation of the steam passing through the vessels, and the water of condensation passes through the water outlet pipes to the oil separator.

As the impurities of the water of condensation can readily be skimmed off in the grease tank K, the water passed to the feed pump is in a pure state, and consequently incrustation of the boiler is prevented.

Having thus described my invention, I claim as new and desire to secure by Letters
60 Patent—

1. A steam condenser and oil separator, comprising a vessel provided with a series of air tubes passing through the heads thereof and opening into the outer air, and with a series
65 of baffle plates between adjacent air tubes,

and forming concentric sets of baffle plates extending from the upper and lower heads respectively of the vessel, an exhaust pipe leading into the upper part of said vessel, a tank below the vessel, and a pipe leading from the vessel and projecting into the tank, substantially as described. 70

2. A steam condenser and oil separator, comprising a vessel provided with a series of air tubes passing through the heads of the vessel and opening into the outer air, a series of baffle plates between adjacent air tubes and forming two concentric sets of baffle plates extending respectively from the upper and lower heads of the vessel, and an outlet pipe leading out through the upper head, an exhaust pipe leading into the upper part of the vessel, a tank below the vessel, a pipe leading from the vessel and projecting into the tank, and a pipe leading from the bottom of the tank for connection with a feed pump, substantially as described. 80

3. A steam condenser and oil separator, comprising a series of vessels connected together at the top and each provided with a series of air tubes passing through the heads thereof and opening into the outer air, a series of baffle plates between adjacent tubes and forming two concentric sets of baffle plates which extend respectively from the upper and lower heads of the vessels, and an outlet pipe leading out through the upper head, an exhaust pipe leading into the first vessel of the series, a tank below the said first vessel, outlet pipes leading from the bottoms of the several vessels, and discharging into the said tank, and a pipe leading from the tank for connection with a feed pump, substantially as described. 95

4. A steam condenser, consisting of a vessel, a series of air tubes passing through the heads of the vessel and opening into the outer air, a series of baffle plates between adjacent air tubes and forming concentric sets of baffle plates, the said sets projecting from opposite heads of the vessel and extending to within a short distance of the head opposite that from which it projects, and a central outlet pipe leading out through the upper head, substantially as described. 100

5. A steam condenser consisting of the vessel C, the air tubes F arranged in the vessel and passing through the heads of the vessel, baffle plates G G' between adjacent air tubes and arranged in sets, the set G extending from the upper head downward and the set G' extending from the lower head upward, and the pipe H arranged centrally in the vessel and extending to within a short distance of the lower head, substantially as herein shown and described. 110

EDWARD ROWE.

Witnesses:

CLARENCE KENT,
J. A. CROSSMON.