

(No Model.)

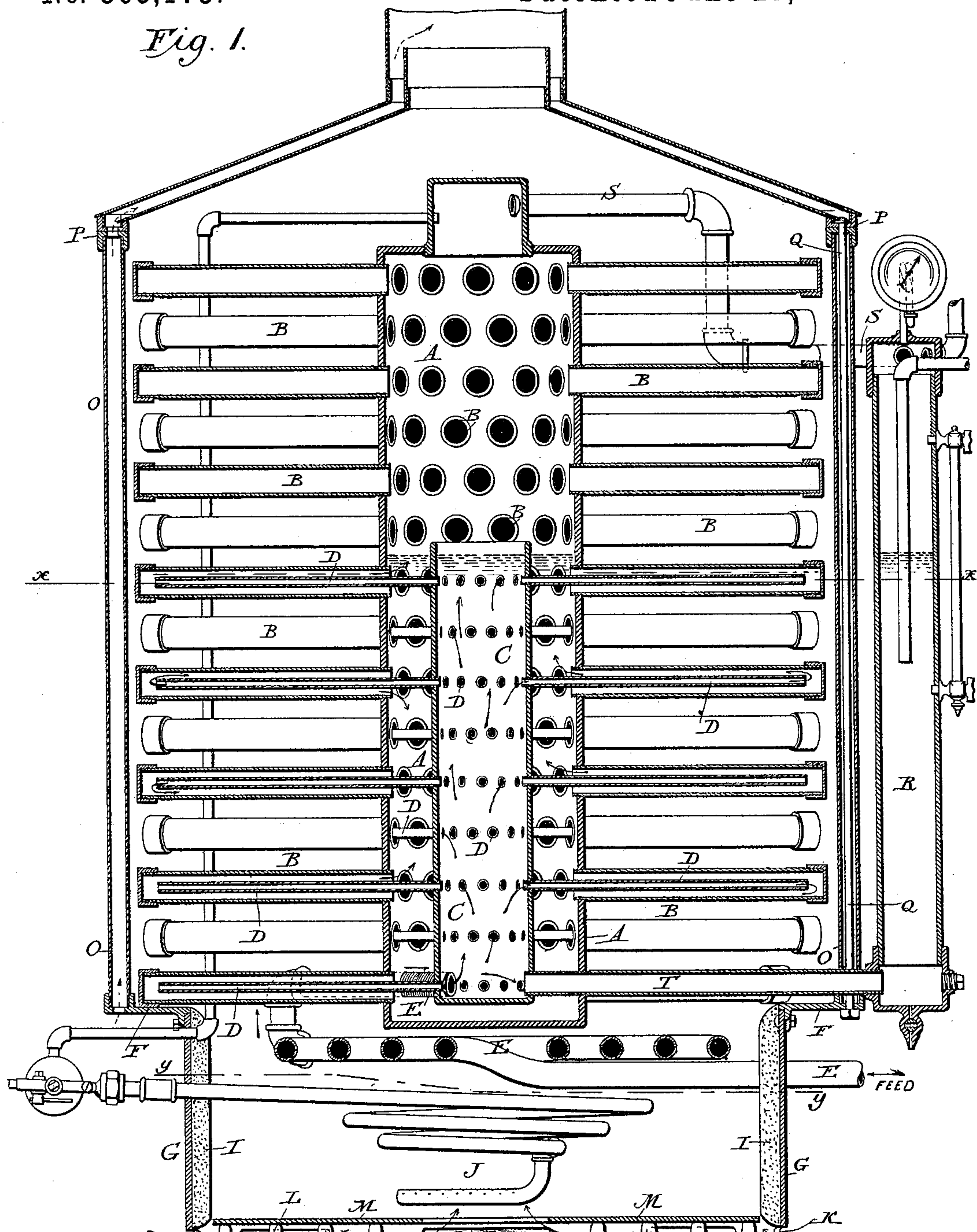
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E. G. DURANT, A. D. LINN & A. SHUPE.
STEAM BOILER.

No. 365,173.

Patented June 21, 1887.

Fig. 1.



Attest.

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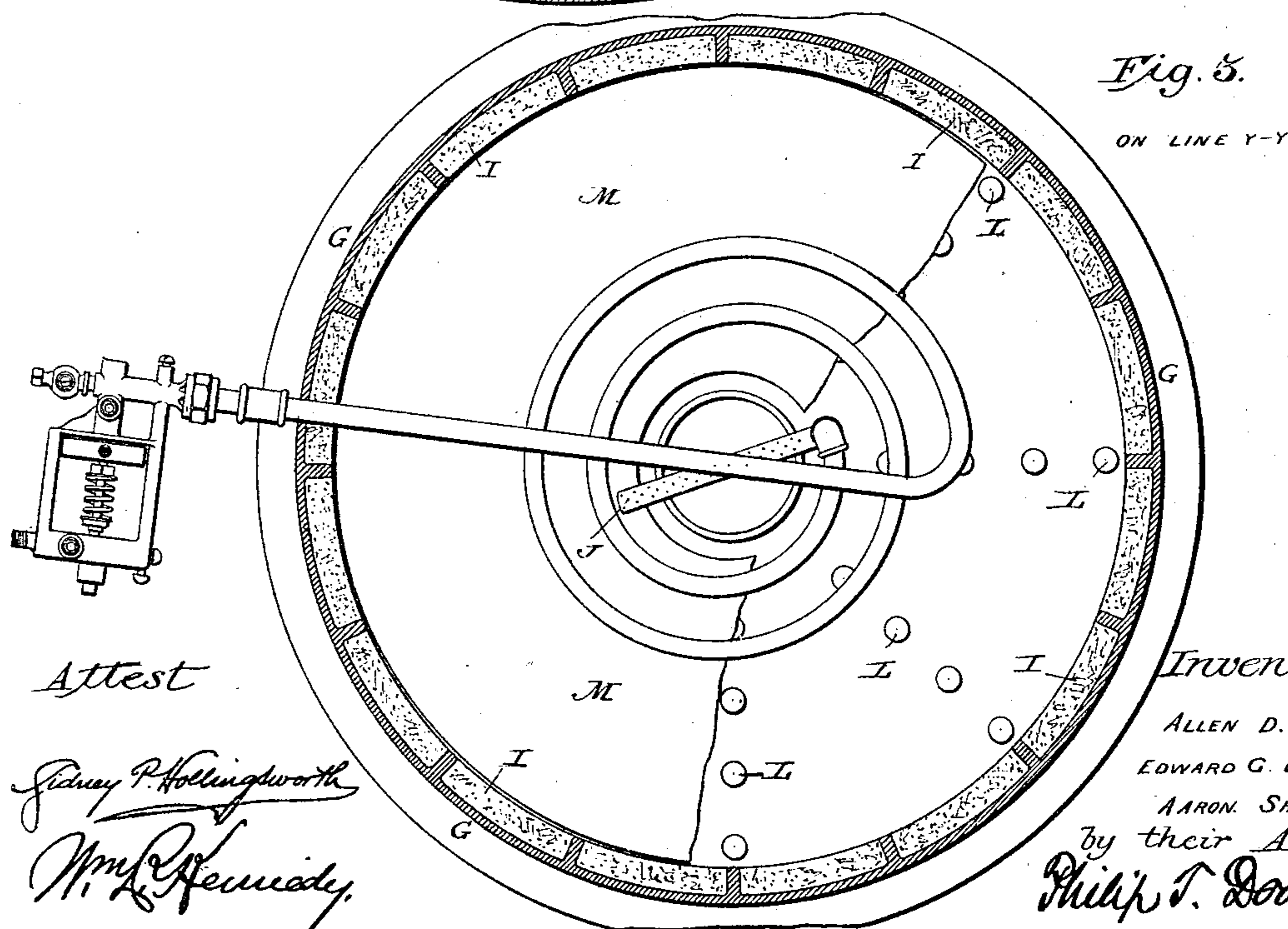
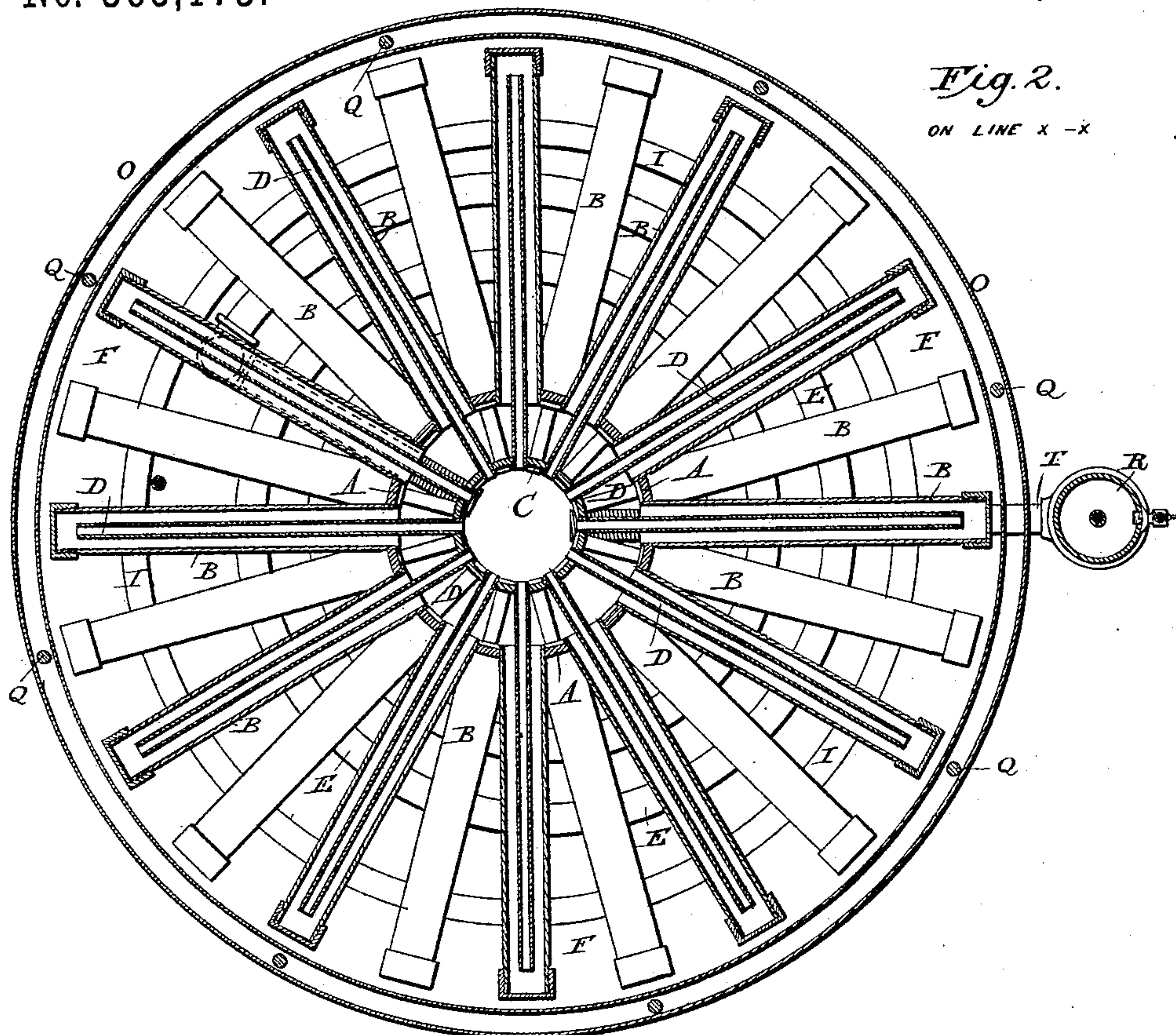
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UNITED STATES PATENT OFFICE.

EDWARD G. DURANT, ALLEN D. LINN, AND AARON SHUPE, OF RACINE, WISCONSIN, ASSIGNORS TO THOMAS KANE, OF CHICAGO, ILLINOIS, AND THE RACINE HARDWARE MANUFACTURING COMPANY, OF RACINE, WISCONSIN.

STEAM-BOILER.

SPECIFICATION forming part of Letters Patent No. 365,173, dated June 21, 1887.

Application filed May 22, 1886. Serial No. 203,036. (No model.)

To all whom it may concern:

Be it known that we, EDWARD G. DURANT, ALLEN D. LINN, and AARON SHUPE, of Racine, in the county of Racine and State of Wisconsin, have invented certain Improvements in Steam-Boilers, of which the following is a specification.

The aims of the present invention are mainly to secure a great extent of heating-surface in proportion to the space occupied by the boiler; to render the boiler practically non-explosive; to secure a thorough circulation of the water therein; to prevent the deposition of sediment, and to afford convenient access to the internal parts at all times.

In the accompanying drawings, Figure 1 represents a vertical central cross-section of our boiler; Fig. 2, a horizontal section of the same on the line $x x$; Fig. 3, a horizontal section on the line $y y$.

In constructing our boiler we first provide a cylinder, A, with both ends sealed or closed. This is preferably formed of a section of wrought-iron pipe having two ends or heads welded or otherwise secured therein. Into this pipe, which forms the body of the boiler proper, we screw a series of radial wrought-iron tubes, B, the outer ends of which are closed by caps screwed thereon, or otherwise, as may be preferred.

Within the body A we place a reservoir, C, of tubular form, having its upper end open and its lower end closed. This reservoir is fixed centrally within the body, a suitable space being left between it and the interior of the body, both at their lower ends and at the circumference, so that the water may circulate freely around and beneath the reservoir. Into the reservoir we screw firmly the inner ends of a series of pipes, D, which extend outward within the pipes B, terminating at the distance of an inch (more or less) from the outer ends of the latter. These smaller pipes are open at both ends. The reservoir C extends slightly above the water-line of the boiler, and the feed-water is introduced directly thereto, preferably at the base, through a pipe, E. The water entering the reservoir C through

this pipe passes outward through the pipes D to the outer ends of the pipes B, in which it is largely converted to steam, and through which it returns around the exterior of the pipe D into the body A, the changing temperature of the water resulting in a rapid and uniform circulation.

It will be observed that the body A is provided with tubes B above the level of the reservoir and above the water-line. These tubes act as superheaters for the steam generated in the lower part of the apparatus. The lowermost tubes, B, are seated at their ends upon and sustained by an annular base-plate, F, flanged and bolted to the upper edge of a cylindrical fire-chamber, G, having a lining, I, of asbestos or like refractory material. This fire-chamber may be provided with a fire-grate or with a gas-burner, J, of the form shown in the drawings, or of any other equivalent form. When this burner is employed, the fire-chamber is provided at its base with a series of air-inlet openings, K, and with a series of internal studs or lips, L, which support a plate, M, lying above the air-inlets and provided with a central opening, as shown in Fig. 1, the construction being such that the air entering at the circumference is compelled to pass beneath the plate M to the central opening, through which it ascends to the fire-chamber, being delivered directly to the burner. The fire-chamber is provided immediately below the central air opening with a receptacle containing a mass of free asbestos, N, or like absorbent material, to receive oil, alcohol, or like material, to serve as a torch to inaugurate the action of the burner.

The body of the boiler is surrounded by a shell or casing, O, consisting of two cylindrical sheet-metal shells seated at their lower ends against annular flanges on the base-plate F, and having between them an air-space to prevent loss of heat by radiation. The sheet-metal shells are seated at their upper ends within a flanged ring, P, the upper edges of which are adapted to receive the lower edges of two sheet-metal cones, forming the top of the casing. The ring P is held in place on

top of the casing and the latter held in place on the base-plate by means of vertical rods Q, arranged as shown.

Outside of the casing we arrange a vertical tube, R, having its upper and lower ends provided with caps, or otherwise closed, and connected at the upper end by a pipe, S, to the top of the steam-space of the body A, and at the lower end by a pipe, T, to the lower end of the reservoir C, or body A, this arrangement causing the water in the tube to stand at the same level as that in the boiler, and also aiding to some extent to equalize the pressures in the boiler and prevent interruption of the circulation. To the external tube, R, we apply the usual water-gage, gage-cocks, pressure-gage, and safety-valve. The feed-pipe E is preferably fashioned into a coil, located in the fire-chamber immediately over the burner, as represented in the drawings, or below it, in order that the feed-water may be delivered into the reservoir C at a temperature near the boiling-point.

We are aware that boilers consisting of an upright body provided with radiating water-tubes are very old in the art, and that outer bodies having radial tubes have been combined with inner bodies having smaller tubes extending outward within the main tubes; but our boiler differs from its predecessors, among other important particulars, first, in having the inner body terminated and closed above the base of the outer body, so that a water-space is provided between them at the base; second, in having the open top of the inner body extended above the water-line, thus insuring and improving the circulation; and, third, in having the feed-water introduced directly into the central body, so that its passage through the tubes and over a very extended heating-surface is secured.

Having thus described our invention, what we claim is—

1. In a steam boiler, the combination of a fire-chamber, a body, A, provided with radiating tubes B, closed at their outer end, said body having its base and its tubes closed directly over the fire-chamber, the central reservoir having an open upper end and a closed lower end, and the latter elevated above the base of the body, that the water may circulate between them, and the tubes D, extending from the reservoir outward within tubes B, and open at the outer end.

2. In a steam-boiler, a body, A, having a series of radial pipes closed at their outer ends, in combination with an internal reservoir, C, open at its top and closed at its bottom, said open top extended above the water-line of the boiler, pipes D, leading from said reservoir into the pipes of the outer body, as described, a feed-water pipe delivering directly into the reservoir, and a steam-delivery pipe leading from the top of the boiler.

3. In a steam-boiler, an upright body, A, closed at both ends and provided with a series of radial tubes closed at their outer ends, in combination with a central reservoir, C, having a closed base and an open upper end extended above the water-line, a series of pipes, D, leading from the reservoir outward within the tubes of the body and open at their outer ends, a stand-pipe, R, and pipes connecting said stand-pipe at its lower end with the water-space and at its upper end with the steam-space of the boiler.

4. In a steam-boiler, the combination of a body, A, a reservoir, C, located therein, its upper end being open and its lower end closed, and a stand-pipe, R, having its lower end connected with the lower part of the central reservoir and its upper end connected with the steam-space of the boiler.

5. In a steam-boiler, the combination of the body and its radial arms, the fire-chamber thereunder, provided with air-inlets at the circumference, the plate M, provided with a central opening and located above the air-inlets, as described, and a burner, J, located above said plate.

6. In a steam-boiler, the fire-chamber provided with studs or projections L and with circumferential air-inlets K, in combination with the plate M, having the central air-passage, and a burner, J, located directly over said air-inlet.

In testimony whereof we hereunto set our hands, this 18th day of May, 1886, in the presence of two attesting witnesses.

EDWARD G. DURANT.
ALLEN D. LINN.
AARON SHUPE.

Witnesses:

W. R. ALLEN,
J. F. BICKEL.