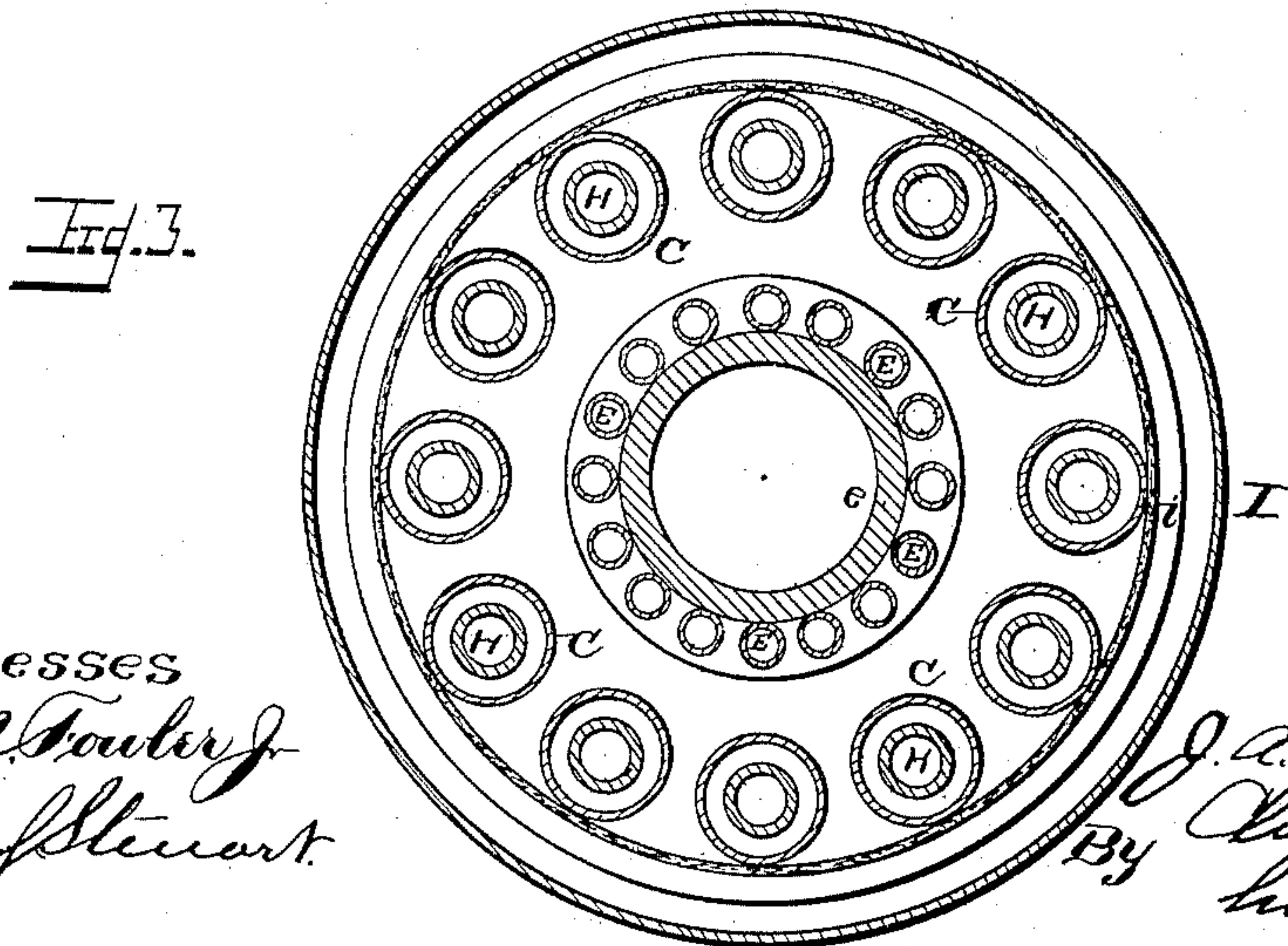
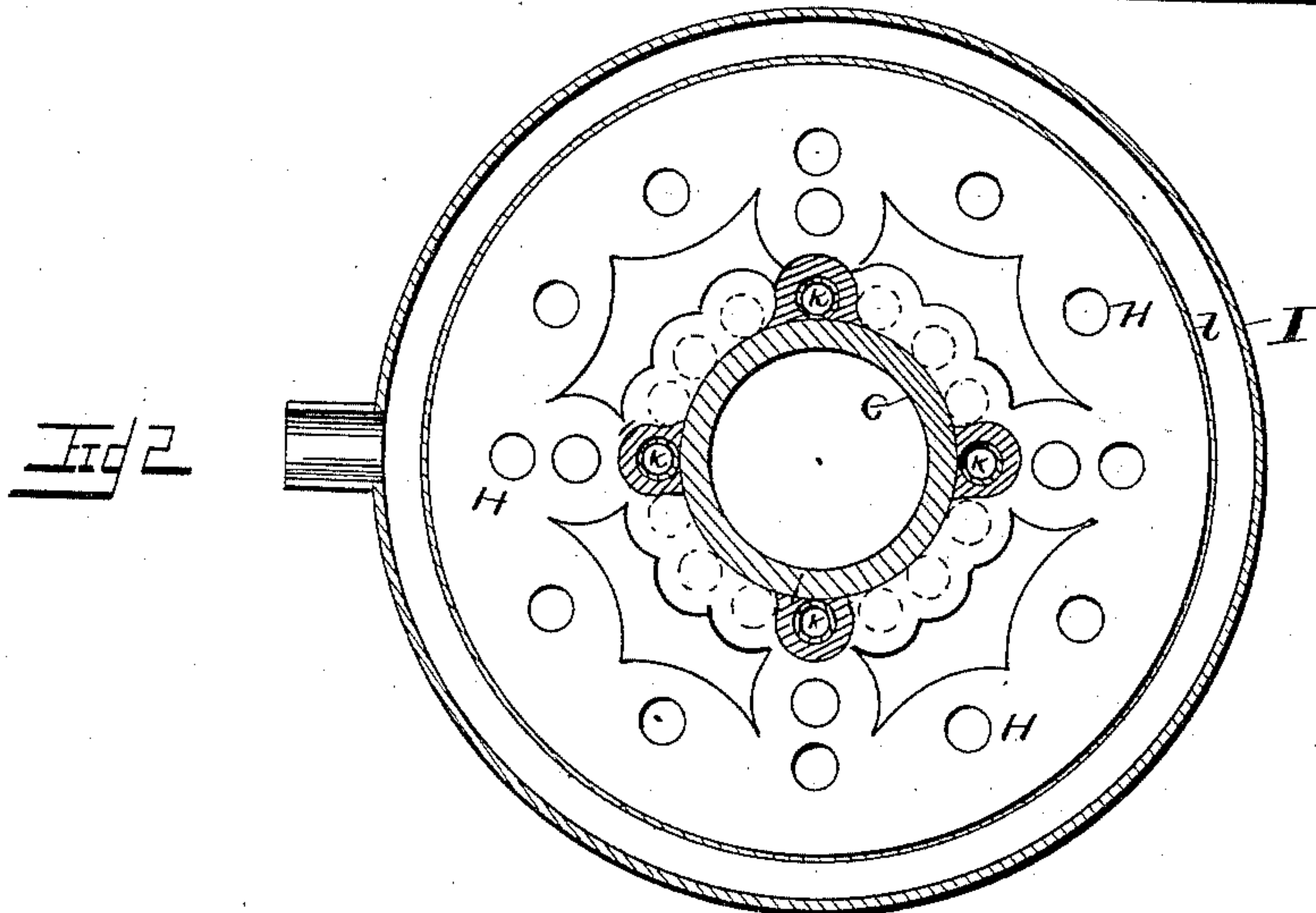
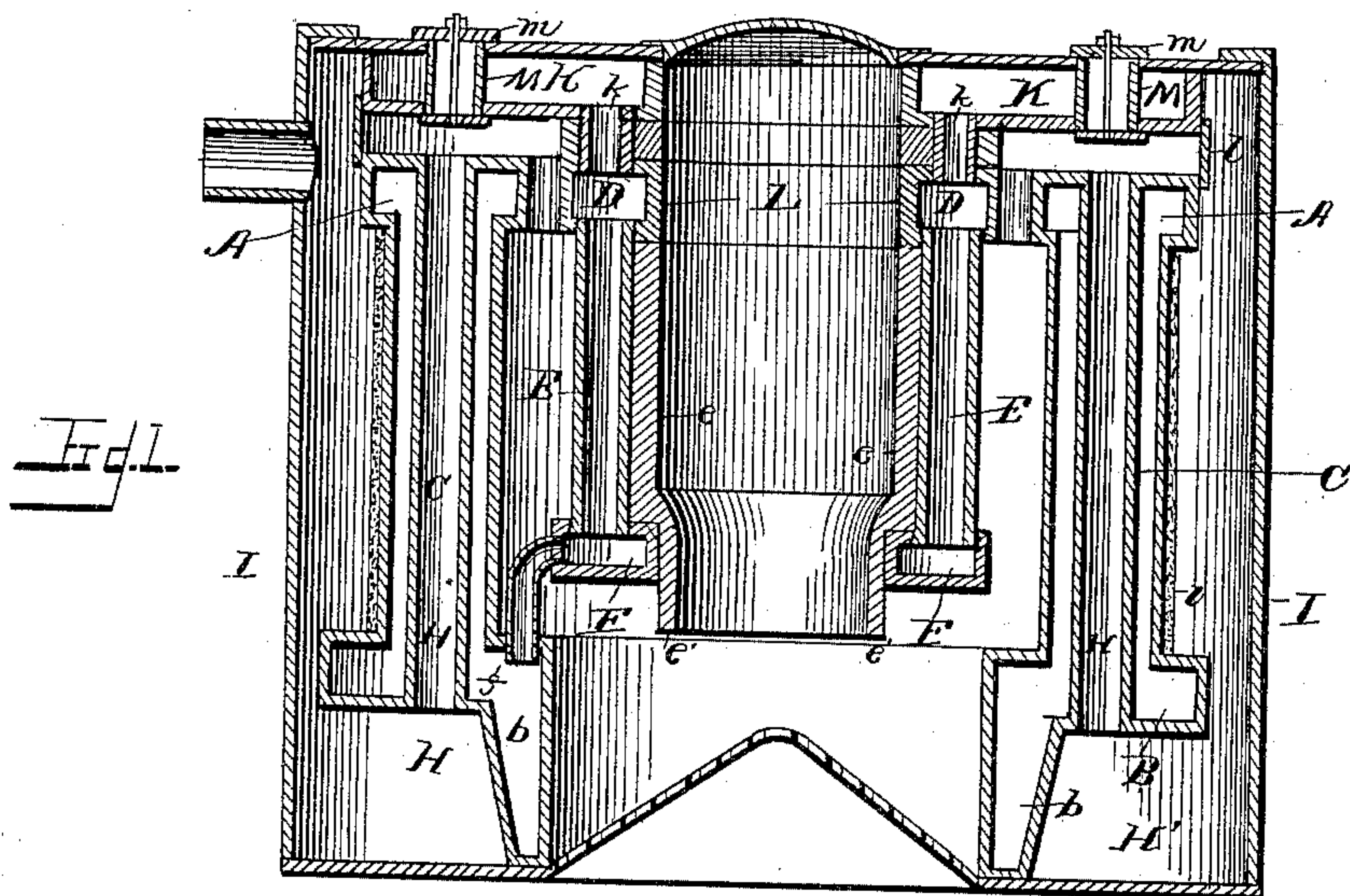


(No Model.)

J. A. CAULDWELL.
BOILER.

No. 464,956.

Patented Dec. 15, 1891.



Witnesses
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UNITED STATES PATENT OFFICE.

JAMES A. CAULDWELL, OF OWEGO, NEW YORK.

BOILER.

SPECIFICATION forming part of Letters Patent No. 464,956, dated December 15, 1891.

Application filed August 5, 1891. Serial No. 401,752. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. CAULDWELL, of Owego, in the county of Tioga and State of New York, have invented certain new and useful Improvements in Boilers; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the letters of reference marked thereon.

This invention relates to improvements in boilers particularly designed for use in heating apparatus, the object being to increase the area of the heating-surface, provide for the rapid circulation of the water, and prevent the burning out of the reservoir and internal portions of the boiler.

With these objects in view the invention consists in the novel construction arrangement, and combination of the various parts, as will be hereinafter described, and pointed out particularly in the appended claims.

Referring to the accompanying drawings, Figure 1 is a sectional view through a boiler constructed in accordance with my present invention. Fig. 2 is a sectional view through the top of the boiler, and Fig. 3 is a sectional view through the boiler and reservoir.

Like letters of reference in the several figures indicate the same parts.

In the present boiler, as in other boilers of this class, top and bottom sections A and B are employed, which are united by tubes C, arranged in circular series around the fire-pot and reservoir, said fire-pot being located centrally, and in my preferred construction is formed by a downward extension *b* of the lower section of the boiler.

The upper section A of the boiler is annular in cross-section, as shown in Fig. 2, and joined to it is an inner annular section D, to the lower portion of which is united a circular series of tubes E, forming in effect the fuel-reservoir, said tubes being united at the bottom by an annular chamber F, which, besides bringing a large body of water close to the incandescent fuel to heat the same, effectually prevents the burning out of the lower portion of the fuel-reservoir, besides promoting the circulation. If desired, a small tube *f* may connect the chamber F with the bottom sec-

tion to facilitate the discharge of sediment and promote circulation.

To complete the fuel-reservoir, a series of sections of cast-iron or fire-brick *e* are located inside of the tubes E, being fitted accurately into the space between the top section D and the lower chamber F, and, if desired, said sections of fire-brick are provided with downward extensions *e'*, which overlie the chamber F and extend down to the fire-pot.

Through the tube C are passed a series of flues H, through which the products of combustion pass after having circulated around through the combustion-chamber and between and around flues C and E.

From the flues H the products pass to the lower combustion-chamber H', thence up around the outside of the flues C, but within the outer casing I and outside of the inner casing *i*, as will be readily understood. With the flues arranged as just described it has heretofore been necessary to provide a cap over the top of the boiler, through which all the pipe connections have to pass, and when it became necessary to inspect or repair the tubes this cap and all the connections had to be dismantled. With a view to overcoming this defect I have provided a second or supplemental boiler-chamber K, which overlies the chambers A and D and is connected to the chamber D by pipes *k*, and to this supplemental chamber all of the connections for the heating apparatus are made.

The space between the upper boiler-section and supplemental chamber is closed on the inside by fire-brick filling L and on the outside by a cap or band *l*. Thus the products of combustion are forced to follow the course before indicated. For the purpose of permitting ready access to the flues H for cleaning and repairing a passage or opening M is formed in the supplemental chamber over each of said flues, said openings being closed by caps *m* to prevent the escape of any products of combustion.

The central fuel-reservoir, it will be noted, is smooth from top to bottom, all irregularities being effectually filled by the fire-brick sections before mentioned, and the fuel-reservoir is closed at the top by a cap or closure of any approved construction.

Having thus described my invention, what I claim as new is—

1. In a boiler, the combination, with the fire-pot and upper section, of the depending tubes forming the fuel-reservoir, the chamber uniting the lower ends of the tubes, the fire-brick section lying between the upper section and said chamber on the inner sides of the tubes and the downward extensions on said fire-brick sections overlying the chamber, substantially as described.

2. In a boiler such as herein described, the combination, with the lower section having the downward extension forming the fire-pot, of the upper section having the depending tubes forming the fuel-reservoir, the chamber uniting the lower ends of the tubes, the tubes uniting the upper and lower sections around the outer edge, and the flues passing through said tubes and sections, substantially as described.

3. In a boiler such as described, the combination, with the upper and lower sections, the tubes uniting said sections, the flues passing through the tubes, and the depending portion forming the fuel-reservoir, of the supplemental sections overlying the upper section and connected therewith by pipes $\frac{1}{2}$, substantially as described.

4. In a boiler such as herein described, the

combination, with the upper and lower sections, the tubes connecting said sections, and the flues passing through the tubes, of the supplemental section connected with the upper section by pipes, and the openings formed in said supplemental section immediately over the flues leading to the tubes connecting the upper and lower sections, substantially as described.

5. In a boiler such as herein described, the combination, with the upper and lower sections, the tubes connecting said sections, the flues passing through said tubes, the chamber D, connected to and forming part of the upper section, the depending tubes forming the fuel-reservoir, and the chamber uniting the lower ends of said tubes, of the supplemental chamber overlying the upper section, the fire-brick filling interposed between the supplemental section and chamber D, the band or cap interposed between the supplemental chamber and upper section on the outside and the sections of fire-brick located between the chambers D and F and forming a lining for the fuel-reservoirs, substantially as described.

JAMES A. CAULDWELL.

Witnesses:

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