

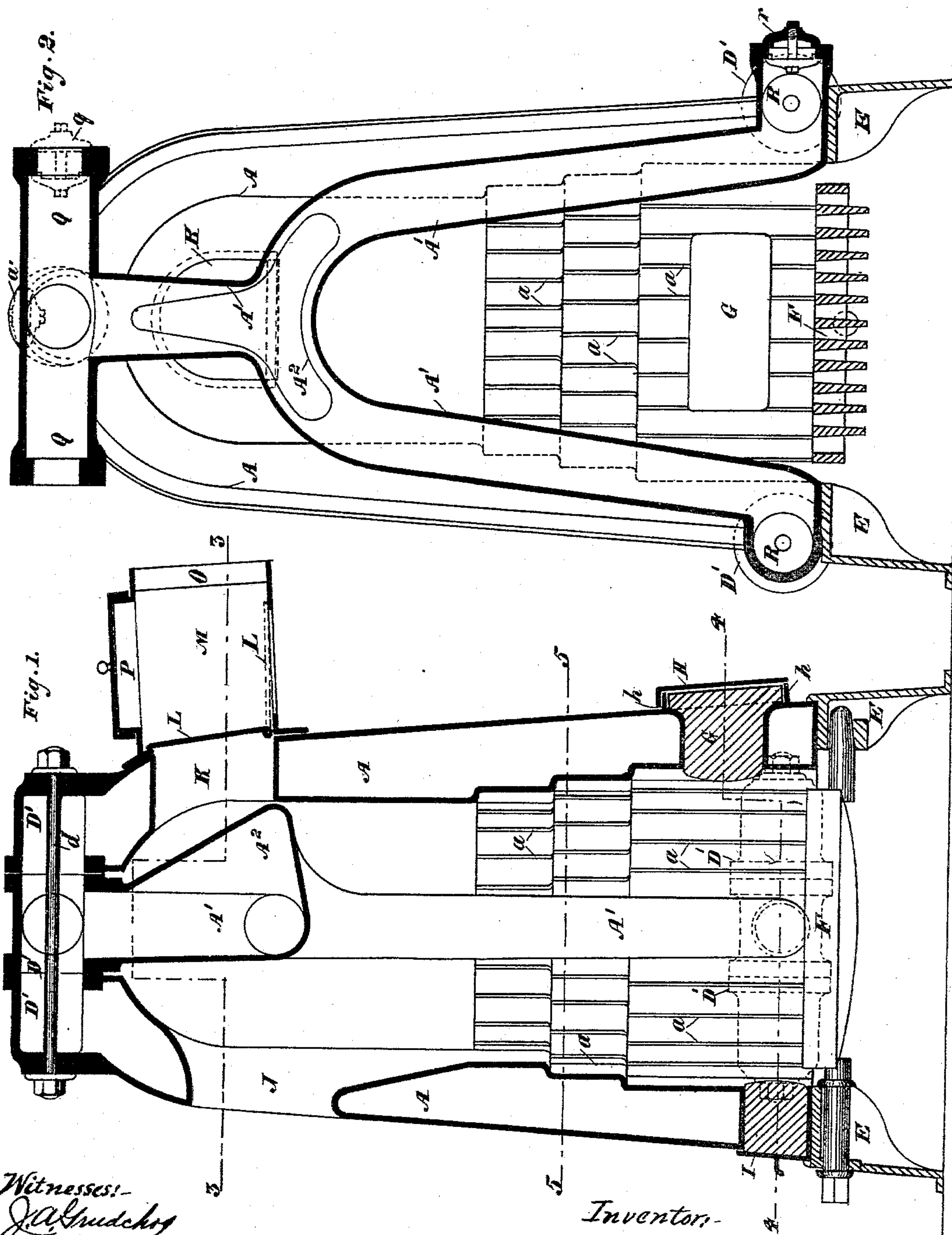
(No Model.)

2 Sheets—Sheet 1.

J. KEITH.
HOT WATER BOILER.

No. 412,098.

Patented Oct. 1, 1889.



Witnesses:
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Inventor:
James Keith.
By: *Richards & Co.*
Attorneys

(No Model.)

2 Sheets—Sheet 2.

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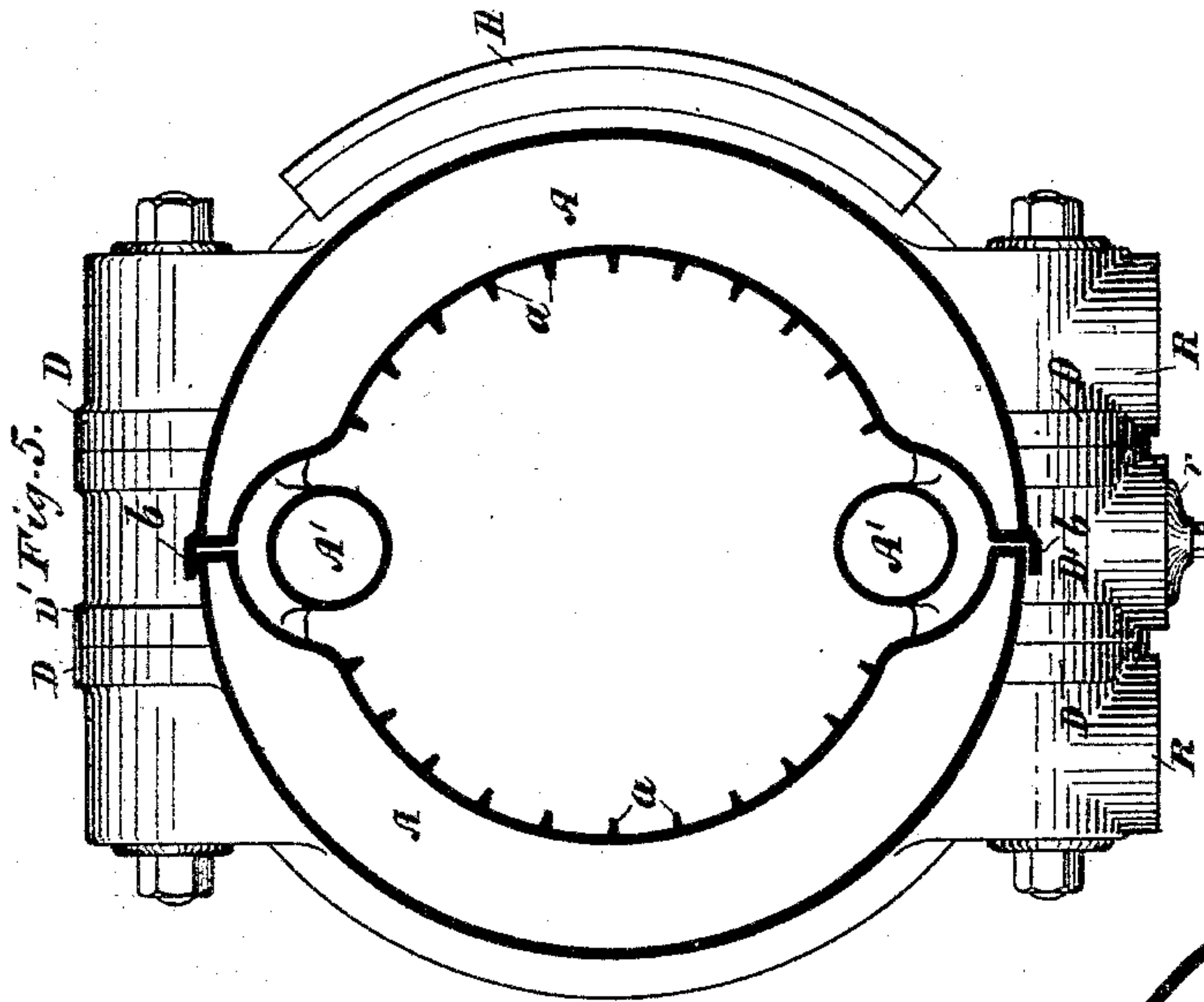


Fig. 5.

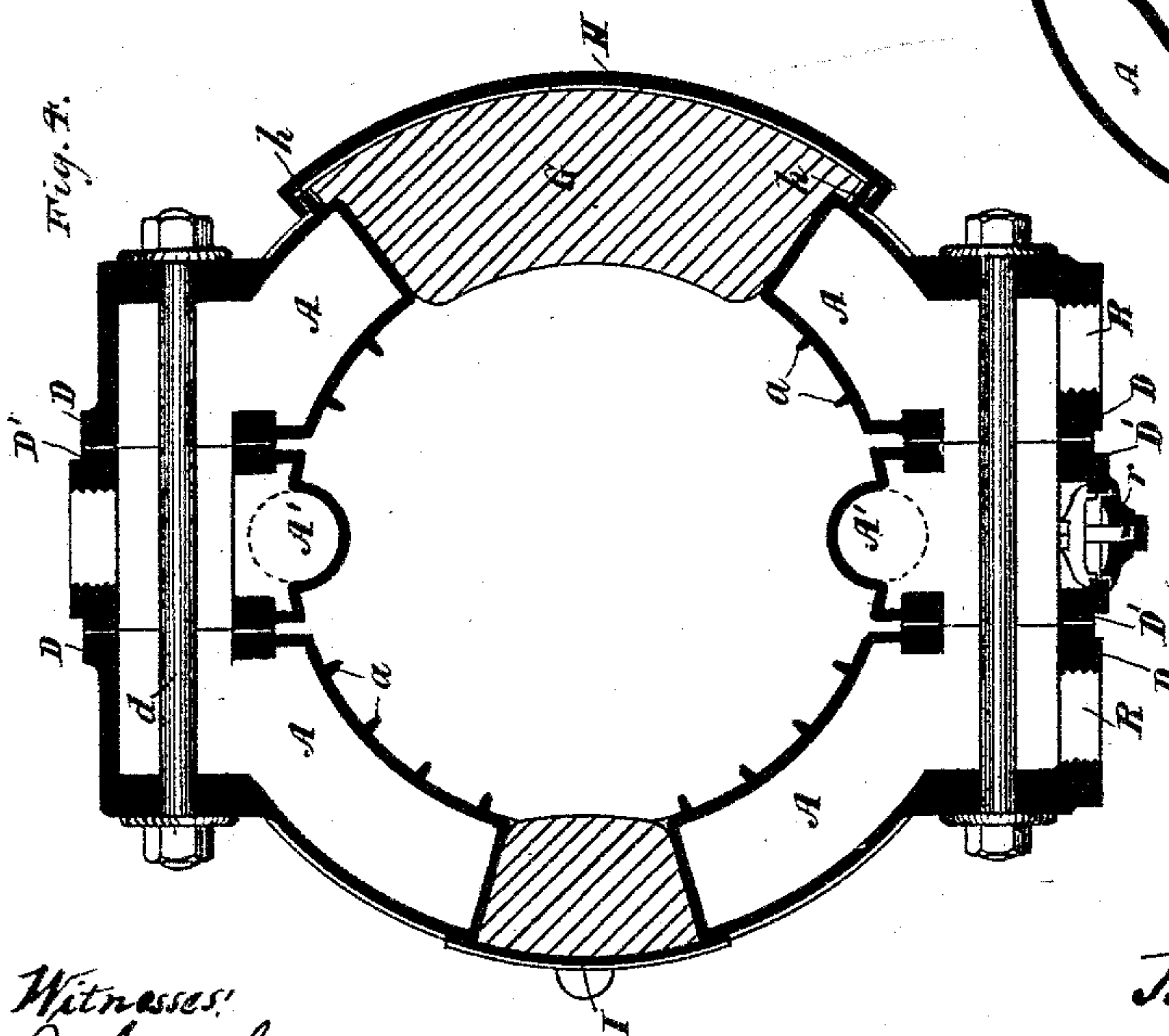
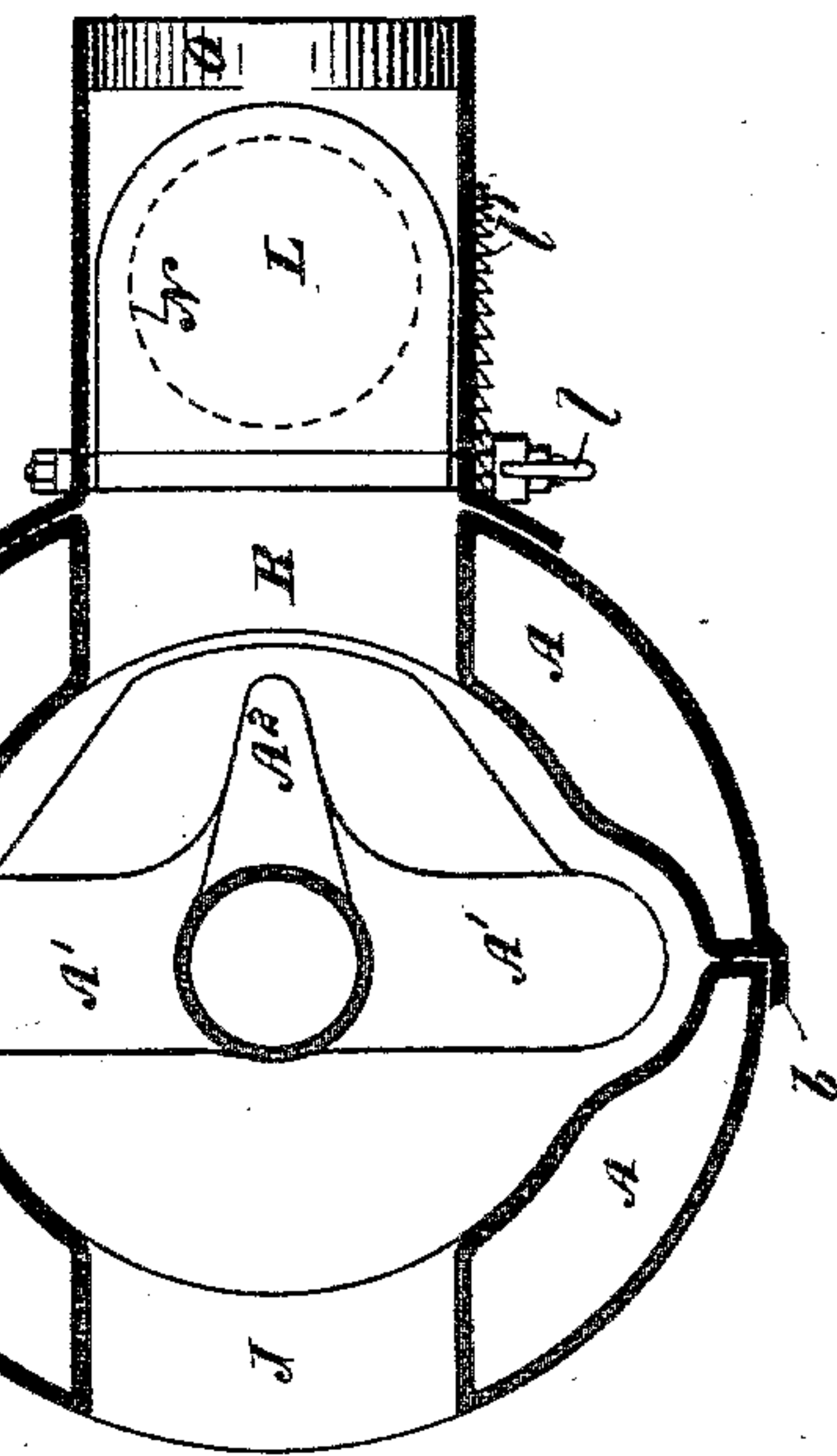


Fig. 4.

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UNITED STATES PATENT OFFICE.

JAMES KEITH, OF LONDON, ENGLAND.

HOT-WATER BOILER.

SPECIFICATION forming part of Letters Patent No. 412,098, dated October 1, 1889.

Application filed July 11, 1889. Serial No. 317,192. (No model.) Patented in England June 17, 1889, No. 9,898.

To all whom it may concern:

Be it known that I, JAMES KEITH, a citizen of the United Kingdom of Great Britain and Ireland, residing at 57 Holborn Viaduct, in the city of London, England, have invented new and useful Improvements in Hot-Water Boilers, (which have not been patented in any country except Great Britain and Ireland by Letters Patent dated June 17, 1889, No. 9,898;) and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art or manufacture to which it relates to make and use the same.

This invention relates, mainly, to boilers of the kind employed for heating water to be circulated through pipes or coils and otherwise for heating purposes.

As shown in the accompanying drawings, in which Figures 1 and 2 are vertical sections taken at right angles to each other, and Figs. 3, 4, and 5 are horizontal sections taken on the lines 3 3 4 4 5 5, respectively, the improved hot-water boiler is composed of an approximately cylindrical and double-cased or annular shell or water-jacket inclosing a combustion-chamber, the said shell or water-jacket being made up of two semi-cylindrical sections A A and a central section A', which is in the form of a bifurcated circulating tube or heater, situated mainly over the fire, the two outer sections A A, which constitute the main portion of the shell, being bolted together at top and bottom with the ends of the central heater between them. Each section is composed of a single casting, and at the joints, which are vertical, the sections A A throughout the greater part of their length abut against each other, flanges or beads b, which admit of closing with putty or other packing, being provided at the meeting faces, and communication between the sections is provided for through flanged orifices D D D' at top and bottom of the whole of the sections, through which pass the bolts d, by means of which the sections are secured together. The flanges at D D D' are faced and brought to bear against each other or upon washers placed between them to render the joints water-tight, these joints being recessed, as shown, and thus protected from the direct action of the fire; but at other points where

the sections meet no facing is required, the beaded joints serving, together with the putty or other packing, to prevent smoke or fire-gases exuding. The sections rest upon a base-piece E, provided with a rocking fire-grate F, as is usual in this class of hot-water boiler, the base being provided with a suitable door.

Immediately over the fire-grate level a large fire-brick G or other piece of slow heat-absorbing and refractory material is inserted through an orifice formed for it in one of the sections A, the said fire-brick being retained in place by means of a flanged cover-plate H, which is dropped over projecting ribs h, formed on the section at the side of the opening. This brick serves to retain heat emitted by the fuel burning on the fire-grate and to prevent the fire dying down when fresh fuel is charged into the combustion-chamber, while the arrangement for retaining the brick in place provides facility for replacing it when worn out. On the section A, opposite the fire-brick and below the water-jacket, is fitted a clinker-door I, also fitted with a fire-brick and adapted to be withdrawn for the removal of clinkers. Near the upper end of the boiler a firing doorway or opening J is formed through one of the sections A, a door of ordinary form being provided, and on the opposite side an outlet-opening K is formed to lead the spent fire-gases to the chimney. At this outlet-opening a combined damper, air-register, and cleaning-door is provided, consisting of a flap L, so hinged or pivoted in the inside of an outlet-flue piece M that it may be tilted upward to close or partially close the outlet K to the chimney and permit the indraft of air through an orifice N at the under side of the flue-piece M, or be brought down to close or partially close the air-inlet N and open the outlet K. The flap L is operated by a hand-lever l, a projection on which is adapted to engage any one of a series of notches on a quadrant l', formed on the flue-piece. Both horizontal and vertical outlets O and P are provided in the flue-piece, so that connection may be made either to a vertical or horizontal chimney-pipe, the outlet not used being suitably covered.

When the combustion-chamber is charged, as may be done, to the level of the charging-

doorway, the heat generated by combustion of the fuel is communicated to the water in the jacket or annular chamber formed by the sections by conduction partly through the inner shell of the sections A A and largely through the tubular section A', acting as a "heater" or circulator, and which, being connected to the sections A at the very lowest and highest points, causes a rapid internal circulation of the water from the lowest parts of the boiler proper to the highest point, the movement of the water through the heater A' being all bodily upward. The lower portions of this section A' are practically immersed in the fuel, while the upper portion largely bars the outlet of the fire-gases to the chimney. The flator saddle part A² of the heater is so constructed as to be self-cleansing from soot and dust immediately over the fire.

To provide for the fuel falling as it is consumed, the internal shell of the water-jacket is stepped or made of conical form, and at intervals vertical projecting pins *a* are or may be formed to better conduct the heat of the fire to the water circulating in the boiler. Connection to one or more flow and return circulating-pipes is made through orifices Q and R at top and bottom of the boiler, and access for cleaning is provided by means of doors, as *q r*, opposite said orifices and, when necessary, in the upper end of the heater A' at *a'* and elsewhere over the semi-cylindrical outer sections, as well as by taking apart the sections, which is readily effected by undoing the connecting-bolts. The return-orifices R may be placed on each or both of the sections A at the lowest point where shown on Fig. 4, on both sides, when the boiler is arranged with cleaning-

doors *q*. When no special cleaning-doors are provided, the returns may be placed at the bottom of the heater or section A' on both sides, as shown at R R on Fig. 4.

Having now described my invention, what I desire to claim and secure by Letters Patent is—

1. A hot-water boiler composed of two approximately semi-cylindrical hollow sections and a central tubular section or heater, constructed and connected substantially as described.

2. In a hot-water boiler, a bifurcated tubular water heater and circulator A', situated within the combustion-chamber so as to be surrounded by the fire or flame, and having connections at top and bottom to the main water-space of the boiler, substantially as set forth.

3. In a hot-water boiler, the combination, with the double-cased shell recessed to hold a fire-brick, of the ribs or flanges *h*, formed in the outer shell, and the flanged sliding cover H, for securing the fire-brick in place, substantially as described.

4. In a chimney-flue or smoke-pipe for hot-water boilers, a combined draft-regulator, ventilator, and cleaning-door, constructed and arranged to operate substantially as described.

In witness whereof I have hereunto set my hand and seal this 1st day of June, 1889.

JAMES KEITH. [L. S.]

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