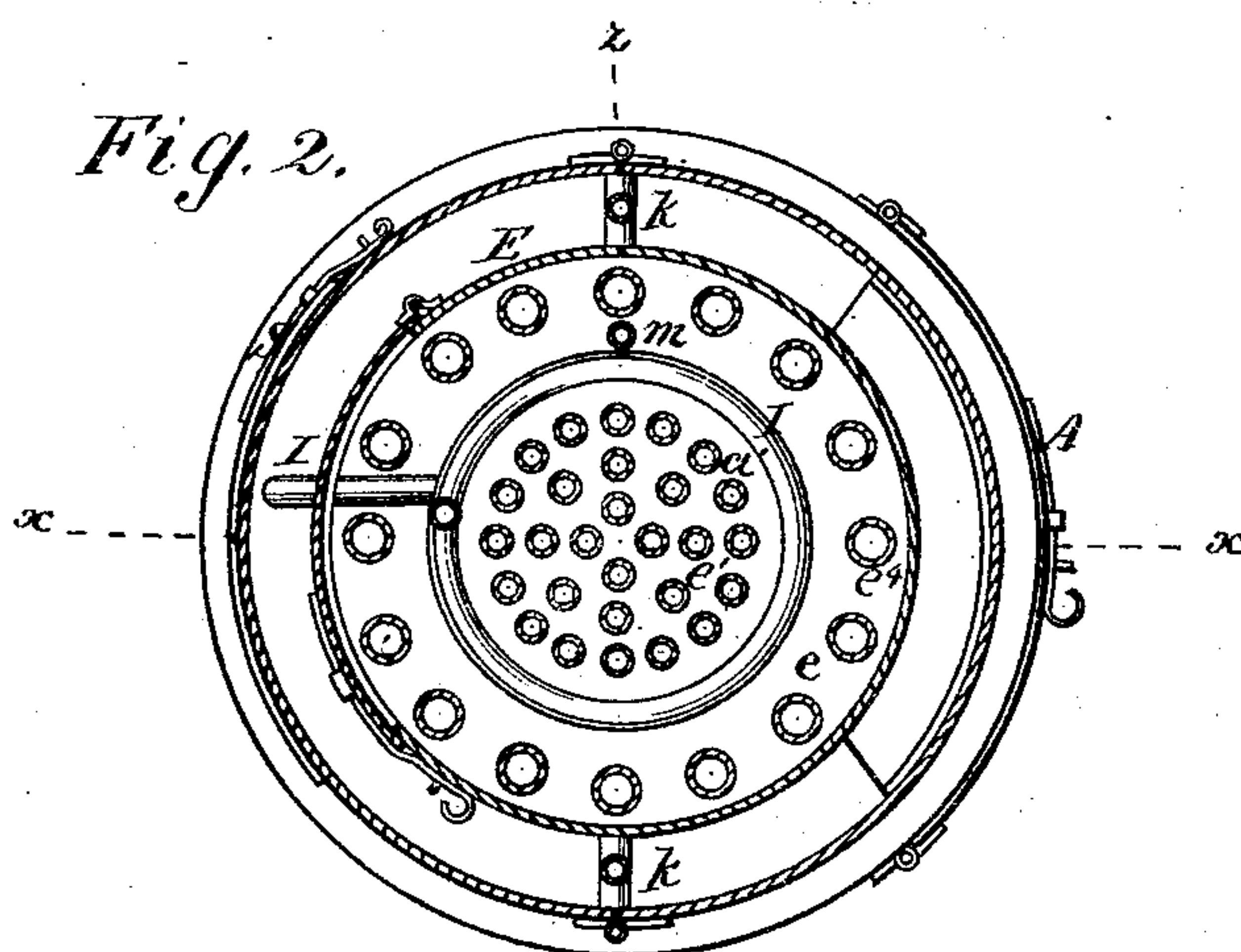
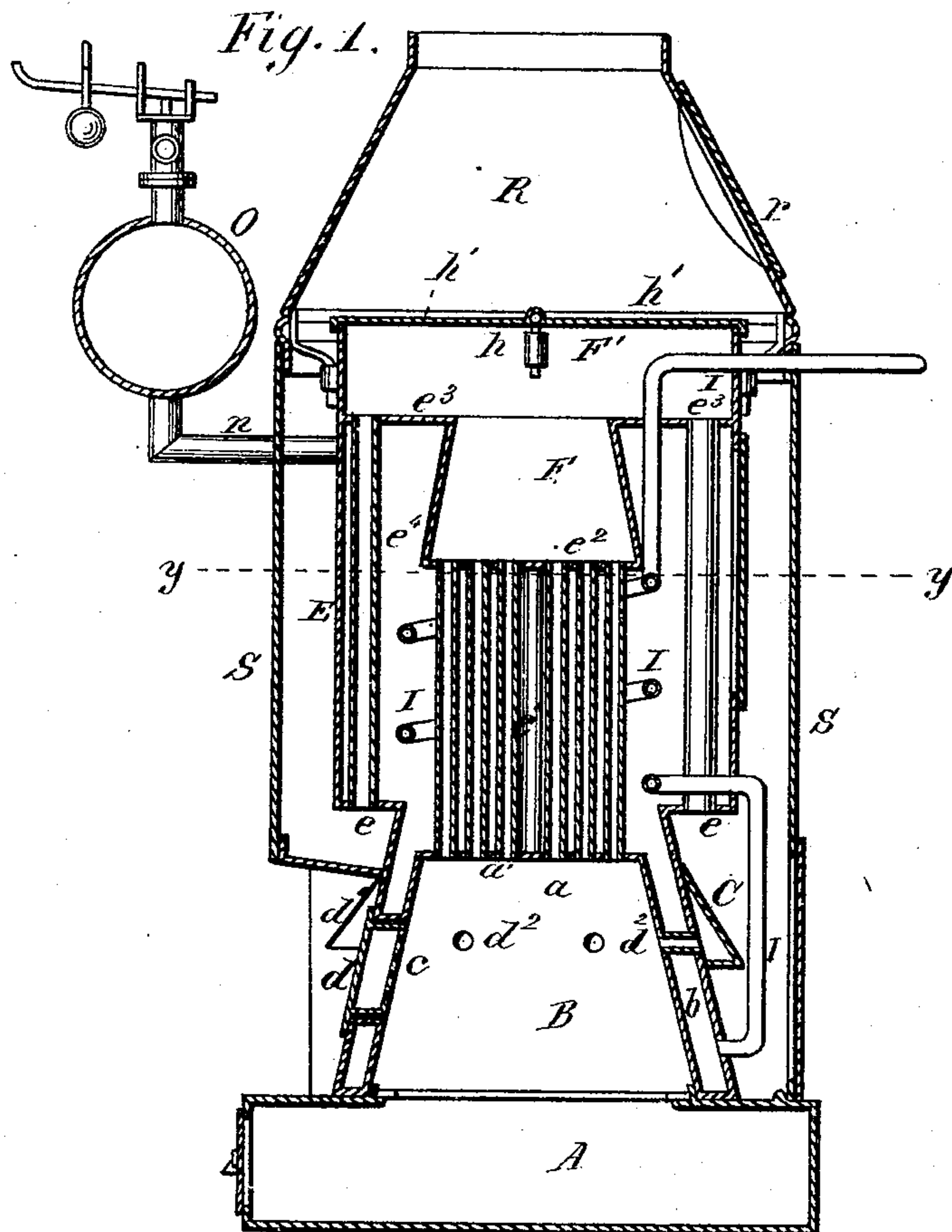


I. BARTON.
Steam-Boilers.

No. 152,064.

Patented June 16, 1874.



Witnesses
C. Thurman.
R. H. Dyer.

Inventor
Isaac Barton,
By Geo. W. Alger & Co.
Attys.

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Fig. 3.

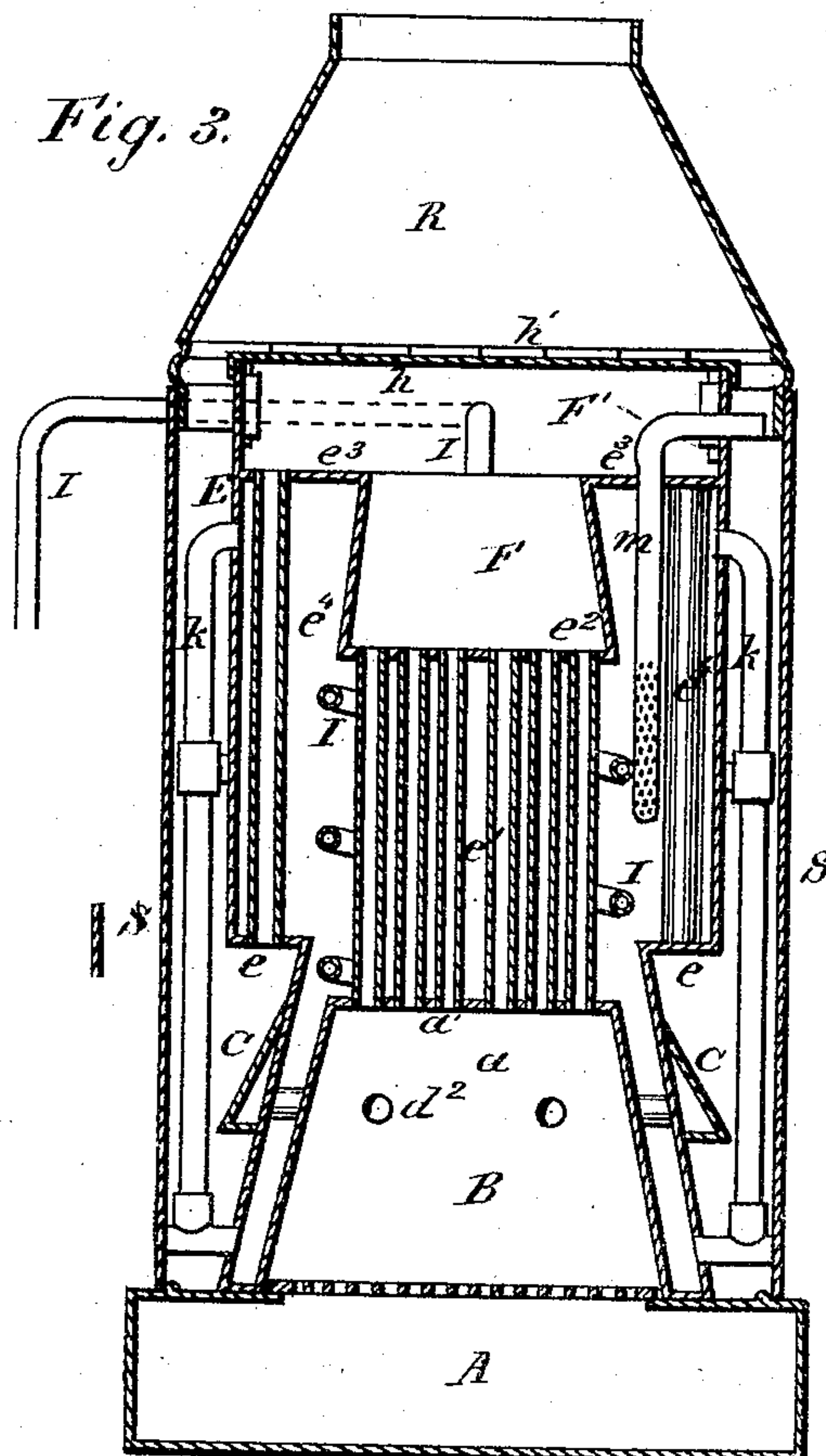
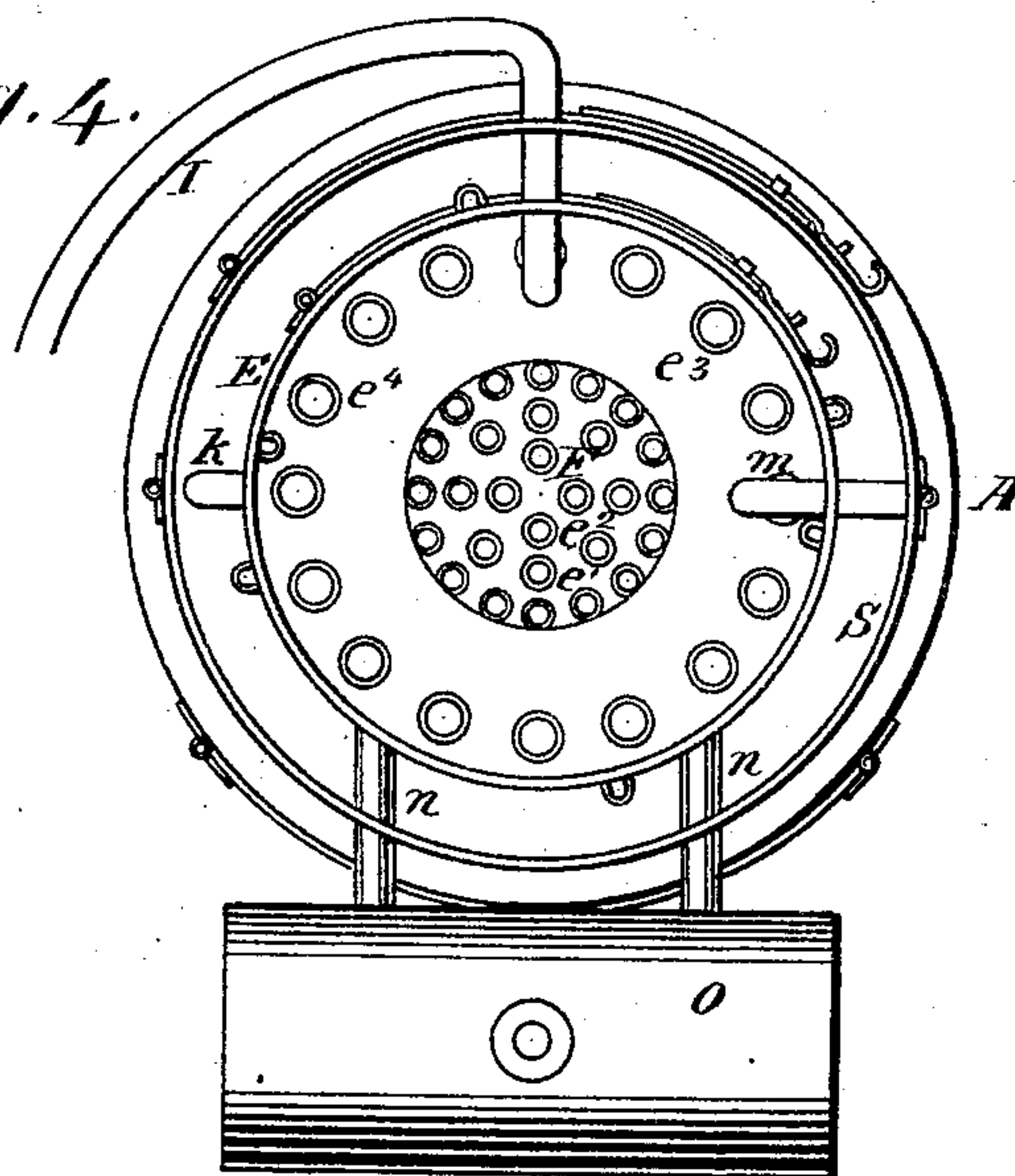


Fig. 4.



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UNITED STATES PATENT OFFICE.

ISAAC BARTON, OF WILLIAMSPORT, PENNSYLVANIA.

IMPROVEMENT IN STEAM-BOILERS.

Specification forming part of Letters Patent No. **152,064**, dated June 16, 1874; application filed April 6, 1874.

To all whom it may concern:

Be it known that I, ISAAC BARTON, of Williamsport, in the county of Lycoming and State of Pennsylvania, have invented a new and useful Improvement in Steam-Boilers; and I do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings and to the letters of reference marked thereon.

The object I have in view is an improvement upon the invention described in Letters Patent of the United States granted to me April 9, 1872, for the purpose of making the same more economical in use, and more effective in result, without materially increasing its first cost; and my invention therein consists in the novel construction and arrangement of the principal operative parts in order to produce the above results, as is more fully hereinafter explained.

In order to enable those skilled in the art to make and use my boiler, I proceed to describe the same in connection with the drawing, in which—

Figure 1 is a vertical central section on line *x x*; Fig. 2, a central cross-section on line *y y*. Figure 3 is a vertical central section on line *z z*; and Fig. 4, a plan from above, the dome being removed.

Similar letters denote like parts in each figure.

Upon the base A of my boiler, having a proper ash-pit, grate, and doors for the removal of ashes, is mounted the fire-box B of considerably less diameter than the base, of a conical form tapering upward of sufficient height to give a fire-chamber, *a*, above the fuel, and made double throughout, leaving a space or chamber, *b*, between its inner and outer walls, which space constitutes water-legs for the boiler; or the outside shell of the fire-box or water-legs may be extended downward, and thus form an ash-pit below the grate. This fire-box is provided with a suitable perforated door, *c*, around which is arranged a flange-plate, *d*, extending out to, and connected with, the outer casing to the boiler, and having upon either side openings *d* near the upper part of the same, which lead into an air-jacket, O, extending from one side of the flange-plate *d*, around the outside of the water-legs, to the

other side of the flange-plate. Suitable openings *d*² are made from this air-jacket into the fire-chamber near its upper part. It follows, then, that cold air entering into the opening *d*¹ will have circulation through said air-jacket, and entering into the fire-chamber, just above the burning fuel, will assist in the combustion of the gases, and aid materially to the draft. The upper part of the fire-chamber is terminated by a diaphragm-plate, *a'*, which also extends over the top of the water-legs. From this plate *a'* the outer plate alone of the fire-box is continued upward to the lower plate *e* of the boiler proper E. This plate *e* extends laterally, and is of greater diameter than the conical structure upon which it rests, which diameter is maintained throughout the entire length of the boiler E. From the diaphragm *a'* a nest of tubes, *e*¹, springs and terminates in the upper diaphragm *e*², which forms the base of the lower combustion-chamber F of conical shape, tapering upward. This chamber F extends to the annular diaphragm *e*³, which connects the top of this conical chamber with the shell of the boiler, and forms the upper diaphragm for the return-flues *e*⁴, which pass between it and the lower plate *e* of the boiler. This diaphragm *e*³ is also the base of the upper combustion chamber F'; which is limited by the topmost plate or cap *h* of the boiler E. This plate or cap *h* is composed of two doors, *h'*, which hinge in the center, and may be raised or taken out, as desirable, in order to allow free access to the interior of the boiler for the purpose of cleaning and repairs. The plate or cap *h* may be further provided with a damper, which allows the direct passage of the gases from the fire-chamber into the dome or smoke-box, in order to assist the draft. A feed-water heater-pipe, I, is introduced near the top of the boiler E, and runs spirally around the nest of tubes *e*¹, and between them and the flues *e*⁴. This pipe I passes out of the boiler E near its base, and on the same side on which it enters, and continues downward as a straight pipe to a low point in the water-legs. This pipe, being exposed throughout its entire length to the action of the heated gases, injects the feed-water into the boiler at a high temperature, and economizes the heat to great advantage. The water in this boiler will be

carried at about the height of the diaphragm e^2 , and the space above this point will be steam-space. It will be seen, therefore, that the peculiar shape and position of the combustion-chambers makes them very useful as superheaters to dry the steam. Pipes k , called circulating-pipes, are arranged vertically upon the outside of the boiler, and connect the water-space above with the water-legs below, thus allowing a freer circulation of the water, and its greater exposure to the heated gases. These pipes, continuing up as high as the steam-space, are further utilized as convenient positions for the various and necessary gages and cocks. The surface blow-off m is perforated at its lower extremity to accommodate itself to the varying height of water in the boiler. The various impurities that gather at or near the surface may be gotten rid of by means of this pipe. The steam-pipes n , which connect the steam-space with the steam-drum O , complete the immediate accessories of the boiler E . The dome R , of conical shape tapering upward, surmounts the boiler E , and is so arranged that it is connected with it immovably, so that the outside shell or jacket S may be taken down without removing the smoke-stack. Its diameter at its base is greater than the diameter of the boiler, and the same as that of the outer jacket or shell S , which extends from it to the base A of the boiler. The dome R is provided with a large door, r , which permits entrance into the interior of the boiler, and allows the admission of the flue-brushes, and such other instruments as are necessary for cleaning and repairs. The outer jacket S is made of thin sheet-iron in sections, or of brick, to allow of its being readily taken down, in order to further facilitate access to

different parts of the boiler. In connection with the dome R it forms an uptake for the products of combustion which have passed through the return-flues, and causes a complete envelopment of the boiler in a jacket of hot gas, which it restrains and guides up the chimney. In small boilers this jacket may be continued downward, and form the shell of the ash-pit. The steam-drum O is a cylindrical drum of sufficient capacity to correspond with the rest of the boiler. It is placed so as to be in close connection with the steam-space, and, owing to its high position, takes up no extra amount of room. It affords a convenient receptacle for the steam, and obviates all danger of wet steam—a point deserving great consideration.

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

1. In combination with a boiler, E , a feed-water-heater pipe, I , passing spirally between two clusters of tubes, e^1 and e^4 , constructed and arranged substantially as described.

2. In combination with the boiler E , the lifting and removable cap h , composed of the doors h' , constructed and arranged substantially as described and shown.

3. A steam-boiler wherein the furnace B , air-jacket C , spiral feed-water pipe, I , tubes e^1 , and doors h h' are combined, constructed, and arranged substantially as described and shown.

This specification signed and witnessed this 20th day of March, 1874.

ISAAC BARTON.

Witnesses:

JOHN EUTERMARCKS,
F. STRAYER.