

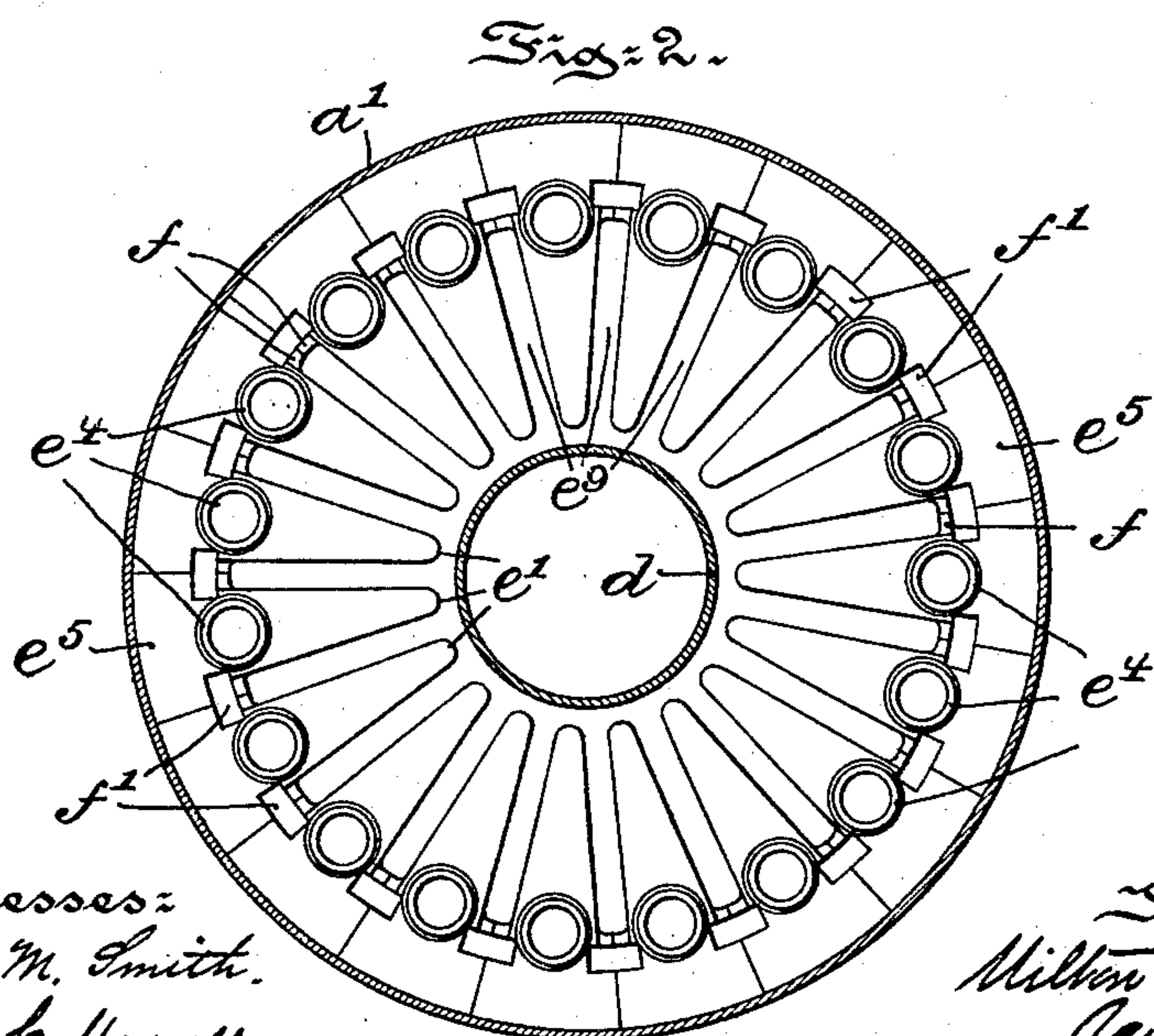
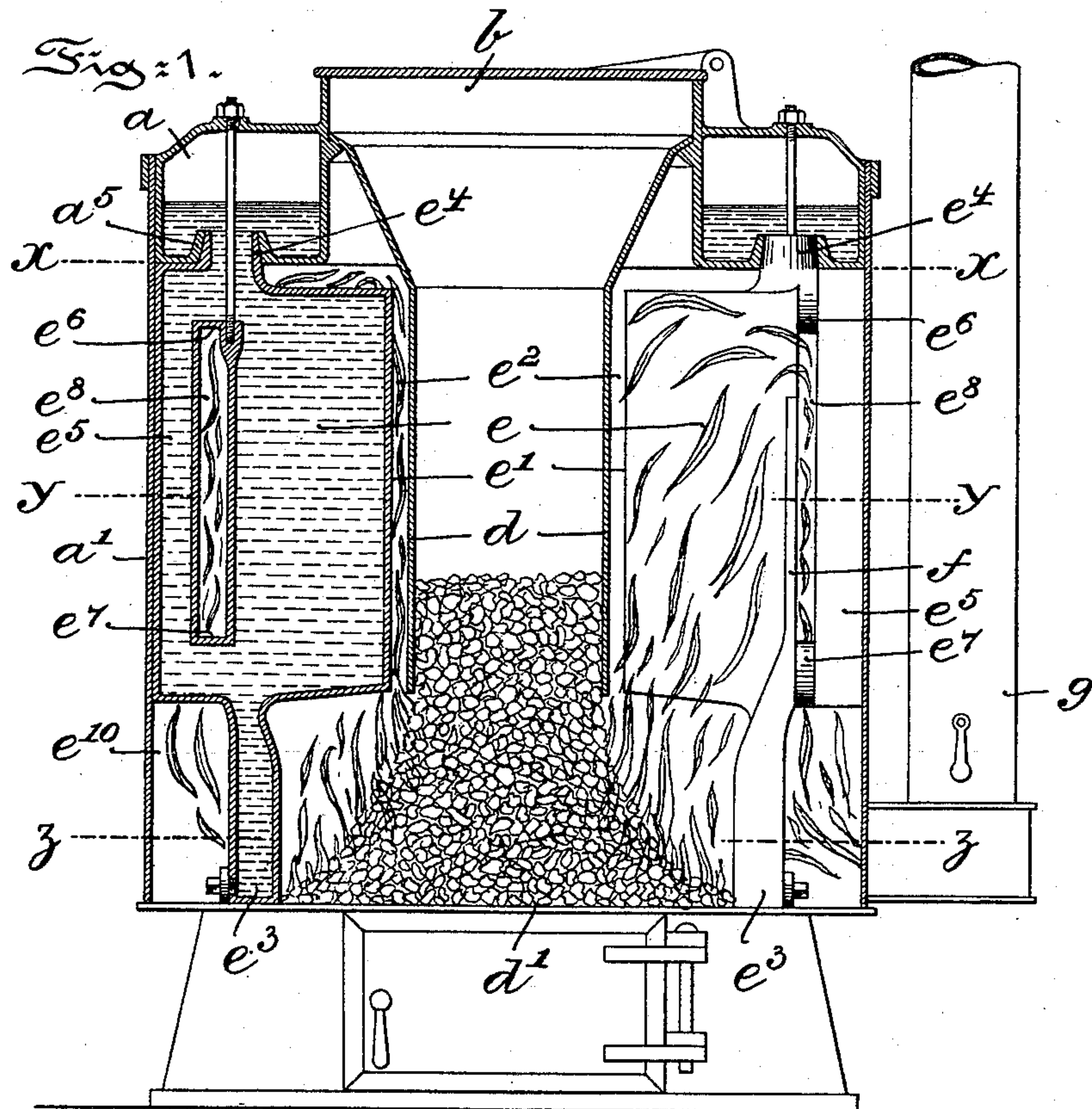
(No Model.)

2 Sheets—Sheet 1.

M. O. ROBERTS.  
WATER HEATER OR BOILER.

No. 596,717.

Patented Jan. 4, 1898.



289 witnesses:-  
Thomas M. Smith.  
Richard C. Maxwell.

Inventor:  
Milton O. Roberts.  
By J. Walter Douglass  
Attorney:

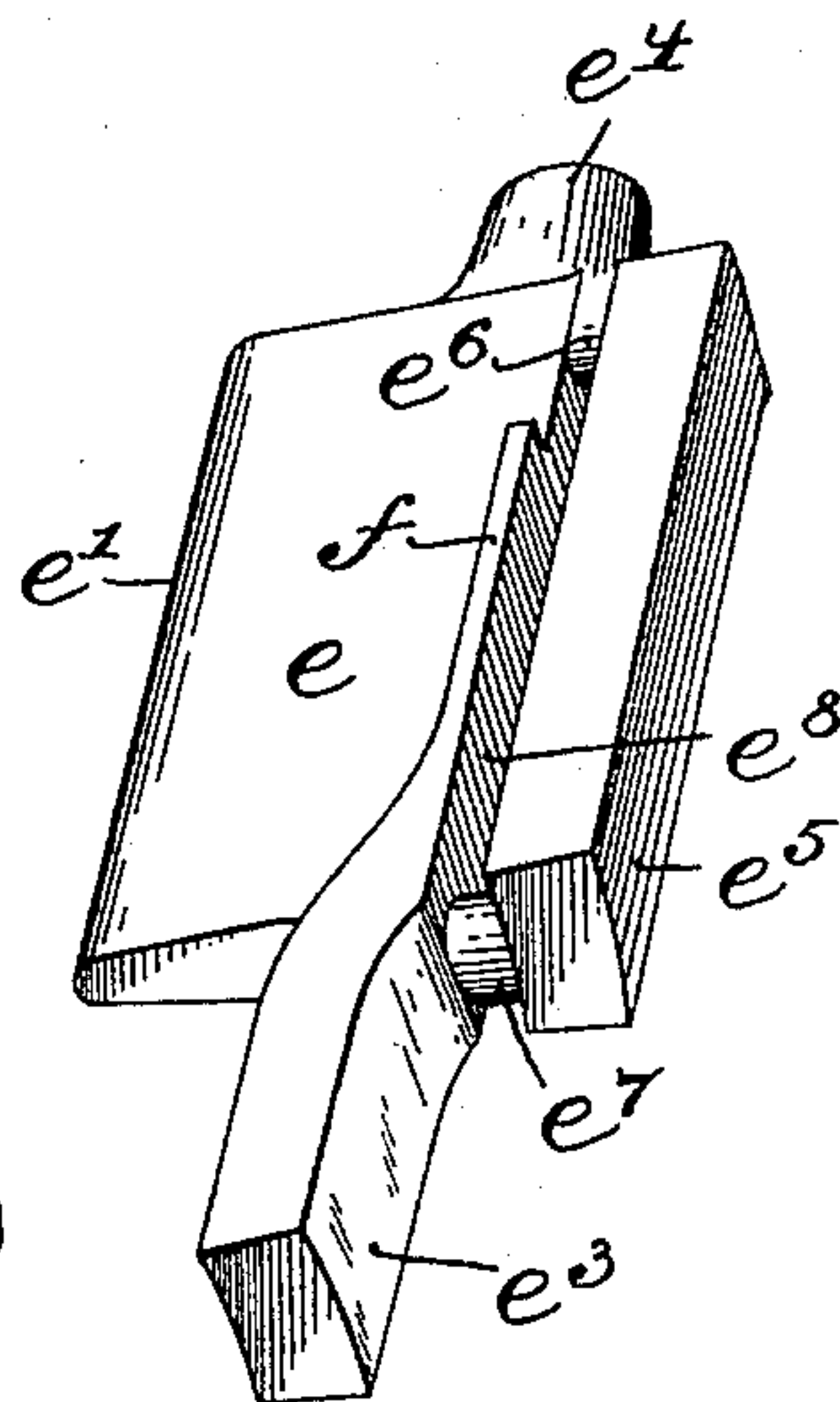
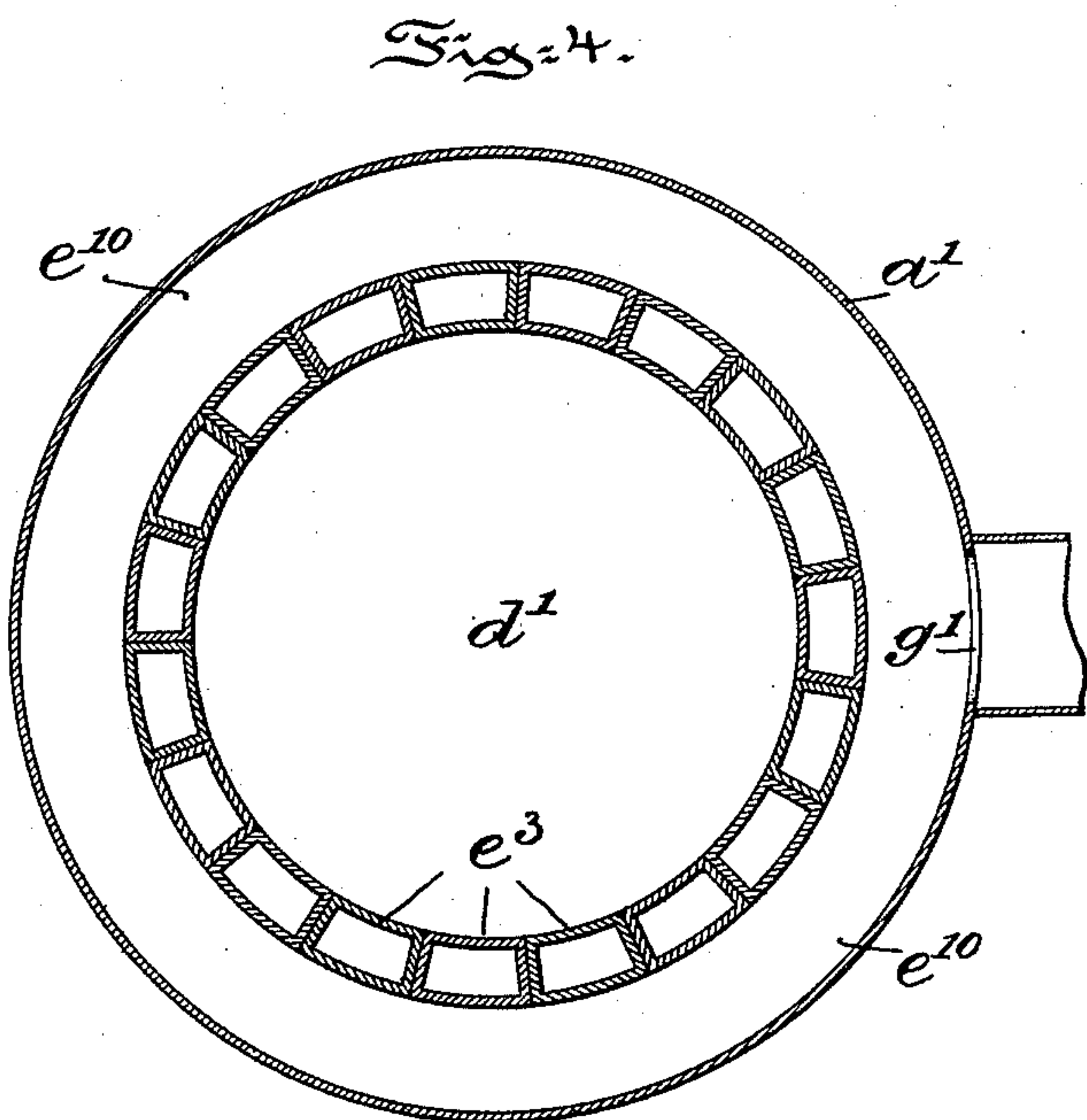
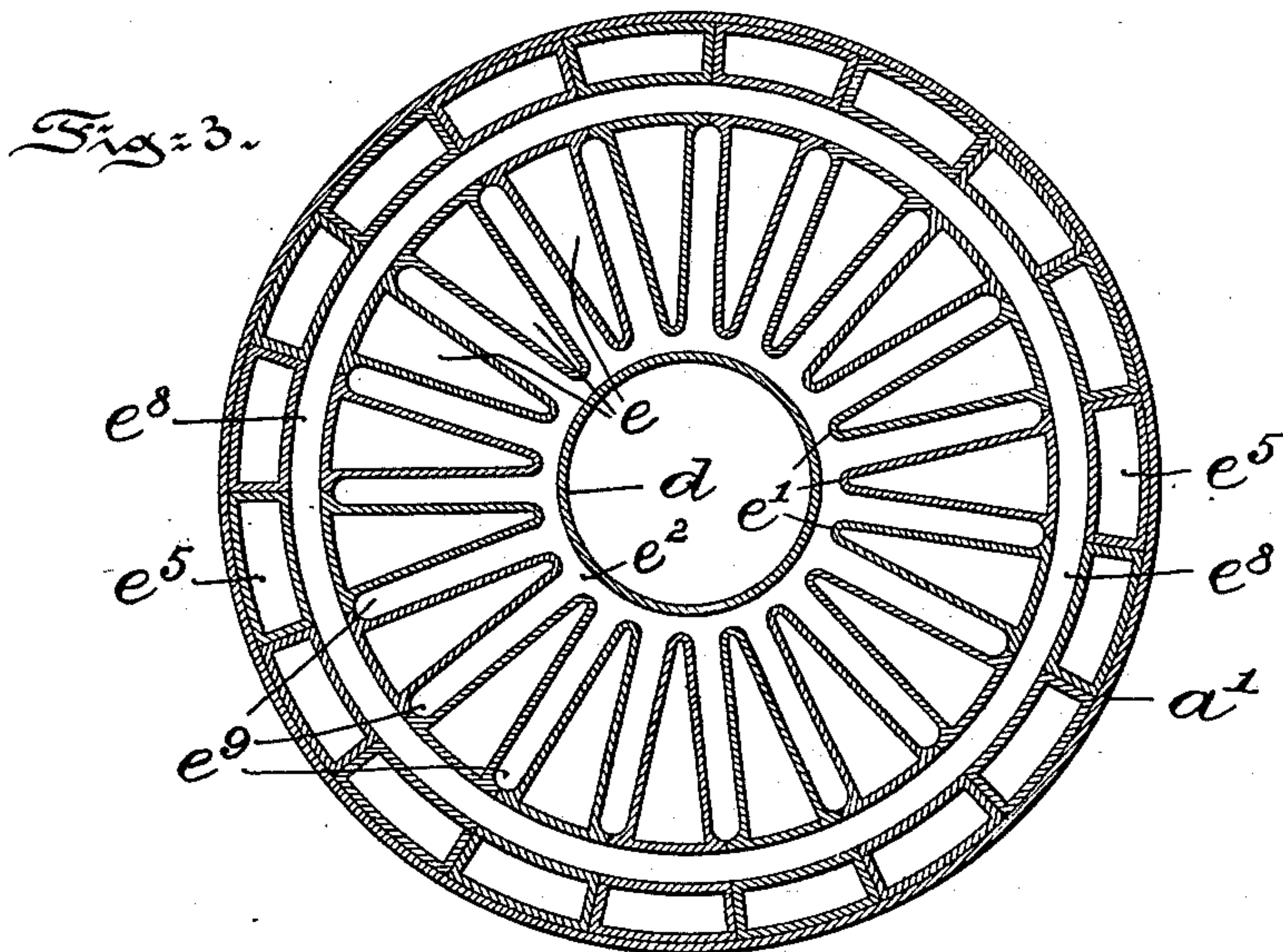
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# UNITED STATES PATENT OFFICE.

MILTON O. ROBERTS, OF COLLEGEVILLE, PENNSYLVANIA, ASSIGNOR TO  
THE ROBERTS MACHINE COMPANY, OF SAME PLACE.

## WATER-HEATER OR BOILER.

SPECIFICATION forming part of Letters Patent No. 596,717, dated January 4, 1898.

Application filed May 22, 1897. Serial No. 637,671. (No model.)

*To all whom it may concern:*

Be it known that I, MILTON O. ROBERTS, a citizen of the United States, residing at Collegeville, in the county of Montgomery and State of Pennsylvania, have invented certain new and useful Improvements in Water-Heaters or Boilers, of which the following is a specification.

My invention has relation to water-heaters or boilers wherein the water to be heated is conducted through a series of sections surrounded by fire-gases to insure a rapid and thorough heating of the water, and in such connection it relates to the construction and arrangement of such a heater or boiler and the sections thereof.

The principal objects of my invention are, first, to provide a water-heater or boiler of comparatively simple construction consisting of a series of sections, each having a main body overhanging, as to a portion, the fire-bed and terminating in a water-leg comprising, when a series is assembled, the wall of the fire box or magazine, and the upper portion of each body terminating in a contracted extension or nipple embracing the sleeve of a dome or reservoir; second, to provide a heater or boiler with a series of sections or bodies, each consisting of a main water-chamber, an auxiliary chamber or water-chamber or water-back, and a flue partially separating said main chamber from said auxiliary chamber or water-back, the said flue being adapted to direct the heat and conserve the same by imparting it to the circulating water of said chambers, and, third, to provide a heater or boiler with main and auxiliary water-chambers and a flue for directing the heat and conserving the same, and the said flue partially separating said chambers from one another, whereby is permitted more complete circulation of the water in the operation of the heater or boiler.

My invention, stated in general terms, consists of a water-heater or boiler when constructed and arranged in substantially the manner hereinafter described and claimed.

The nature and scope of my invention will be more fully understood from the following description, taken in connection with the accompanying drawings, forming part hereof, in which—

Figure 1 is a vertical central section of a water-heater or steam-boiler embodying the main features of my invention. Fig. 2 is a horizontal sectional view on the line  $x x$  of Fig. 1. Fig. 3 is a similar view on the line  $y y$  of Fig. 1. Fig. 4 is a similar view on the line  $z z$  of Fig. 1, and Fig. 5 is a perspective view of one of the sections detached from the water-heater or steam-boiler.

Referring to the drawings,  $a$  represents the dome or water-reservoir of the water-heater or steam-boiler, of preferably annular shape and surrounding a covered inlet-hopper  $b$  for the reception of fuel. To the dome or reservoir  $a$  is secured a tube  $d$ , having a funnel-shaped mouth, and this tube extends downward over and above the fire-box  $d'$  and serves as a chute and magazine for the fuel fed into the fire-box. Concentric with the lower and cylindrical portion of the tube  $d$  is arranged a series of radial water-sections, the general configuration of each of which is as follows: Each section consists of a main body or chamber  $e$ , as shown, of substantially triangular shape in cross-section, but which may be of any other form or shape, and having the angular narrow end  $e'$  rounded and projecting toward the tube  $d$ , from which it is separated by a vertical opening or annular flue  $e^2$ , in communication with the fire-box  $d'$ . The main body  $e$  of each section is provided with a downwardly-projecting leg  $e^3$ , as shown, of substantially rectangular shape in cross-section; but such may be of any other desired shape or configuration and of a width and height sufficient, when joined with the legs of other sections, to form an annular overhanging or projecting wall over the fire-bed of the box  $d'$ , as clearly illustrated in Figs. 1 and 4. The upper end of each main body terminates in a coned or other tubular projection or extension  $e^4$ , fitting into a similarly-shaped sleeve or opening  $a^5$ , provided in the floor or crown-sheet of the dome  $a$ , in order that each main body  $e$  of a section of the series may communicate with the dome  $a$  through a projection or extension  $e^4$ . To the rear of the main body  $e$  of each section is located an auxiliary water-chamber  $e^5$ , communicating with the upper and lower ends of the main body  $e$  by means of nipples or tubes  $e^6$



and  $e^7$ , between which is provided an opening forming, when the sections are assembled, a space or flue  $e^8$  for the passage of the fire-gases in a manner to be hereinafter more fully explained. By reason of their peculiar shape and radial arrangement the main body of each of the said sections is separated from each other by a passage-way or flue  $e^9$ , communicating at the lower end with the fire-box  $d'$ , as clearly illustrated in Figs. 1 and 3. On the sides of the main body  $e$  of each section is formed a flange  $f$ , extending upward from the leg  $e^3$  to within a short distance of the top of the same. The flanges  $f$ , when the sections are assembled, as illustrated in Fig. 2, form an annular wall having openings  $f'$  at the upper ends, furnishing a communication between the vertical flues  $e^9$  and the annular flue  $e^8$ . The flue  $e^8$  communicates at its lower end with a chamber or flue  $e^{10}$ , surrounding the wall of the fire-box, and this flue  $e^{10}$  communicates in turn with the chimney or stack  $g$  by means of an opening or passage-way  $g'$ .

From the above description it will be understood that the fire-gases from the fire-box  $d'$  pass through the vertical annular flue or opening  $e^2$  and also the flues  $e^9$  between contiguous sides of the main body of each of the series of sections of the heater or boiler. From these flues the gases pass through the openings  $f'$ , and then to the annular flue  $e^8$ , arranged between the back of the main body of each section and the auxiliary water-chamber  $e^5$  to better control the circulation and also to economize the heat. From the flue  $e^8$  the gases pass into the lower annular flue  $e^{10}$ , and thence to the stack  $g$ . The gases therefore traverse every exposed surface of each section and at the same time do not attack the upper portion of the exterior shell  $a'$  of the heater or boiler, for the reason that the shell is protected by the auxiliary water chamber or reservoir  $e^5$ , and thereby to insure the best possible results in such types of heaters or boilers, with respect to perfection in the circulation and with marked economy as to the heat.

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

1. A water-heater or boiler, comprising a series of sections or bodies, each consisting of a main water-chamber, an auxiliary cham-

ber or water-back and a flue partially separating said main chamber from said auxiliary chamber or water-back, said flue being adapted to direct the heat and conserve the same, substantially as and for the purposes described.

2. In a water-heater or boiler, a section comprising a main water-chamber, an auxiliary chamber or water-back in communication with the main chamber and arranged between the main chamber and the outer wall of the heater or boiler, a flue partially separating the main and auxiliary water-chambers and a dome or water-reservoir communicating directly with both the main and auxiliary water-chambers, substantially as and for the purposes described.

3. A water-heater or boiler, comprising a series of sections or bodies, each section or body consisting of a main water-chamber, an auxiliary chamber or water-back and a water-leg projecting downward from and in direct communication with the main and auxiliary water-chambers, said auxiliary chamber having an upper and lower communication with the main chamber and interposed between the main chamber and the outer wall of the heater, a flue formed between the main and auxiliary chambers, and a dome or reservoir communicating directly with the upper end of each section or body, the sections being otherwise not in communication with each other, substantially as and for the purposes described.

4. In a water-heater or steam-boiler, a hopper provided with a folding cover, a flue or tube and magazine, a series of sections each having a main body overhanging as to a portion the fire-bed and terminating in a water-leg comprising when a series is assembled the annular wall of the fire box or magazine, and the upper portion of each body terminating in a contracted extension or nipple embracing a sleeve of a dome or reservoir, substantially as and for the purposes described.

In testimony whereof I have hereunto set my signature in the presence of two subscribing witnesses.

MILTON O. ROBERTS.

Witnesses:

J. WALTER DOUGLASS,  
THOMAS M. SMITH.