

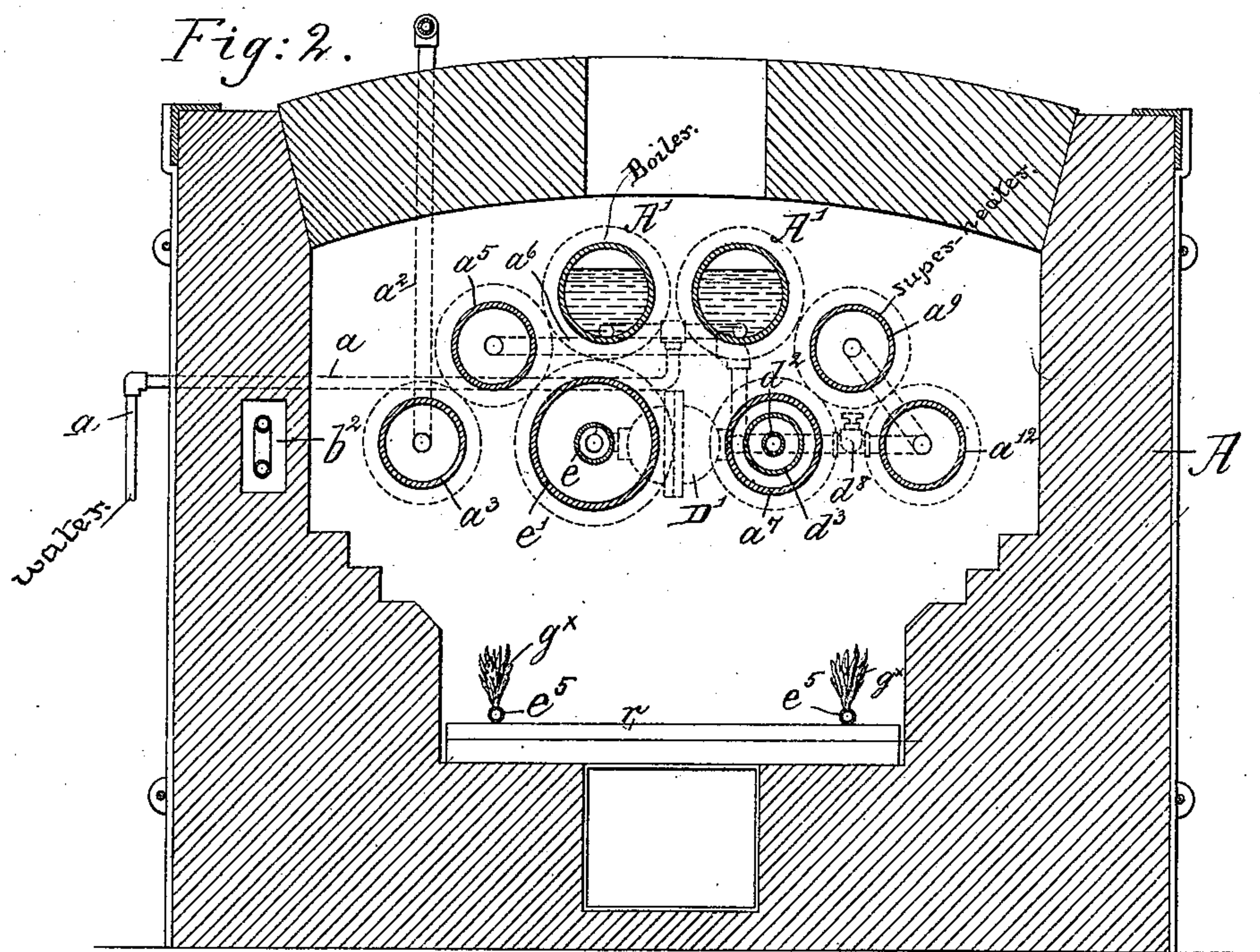
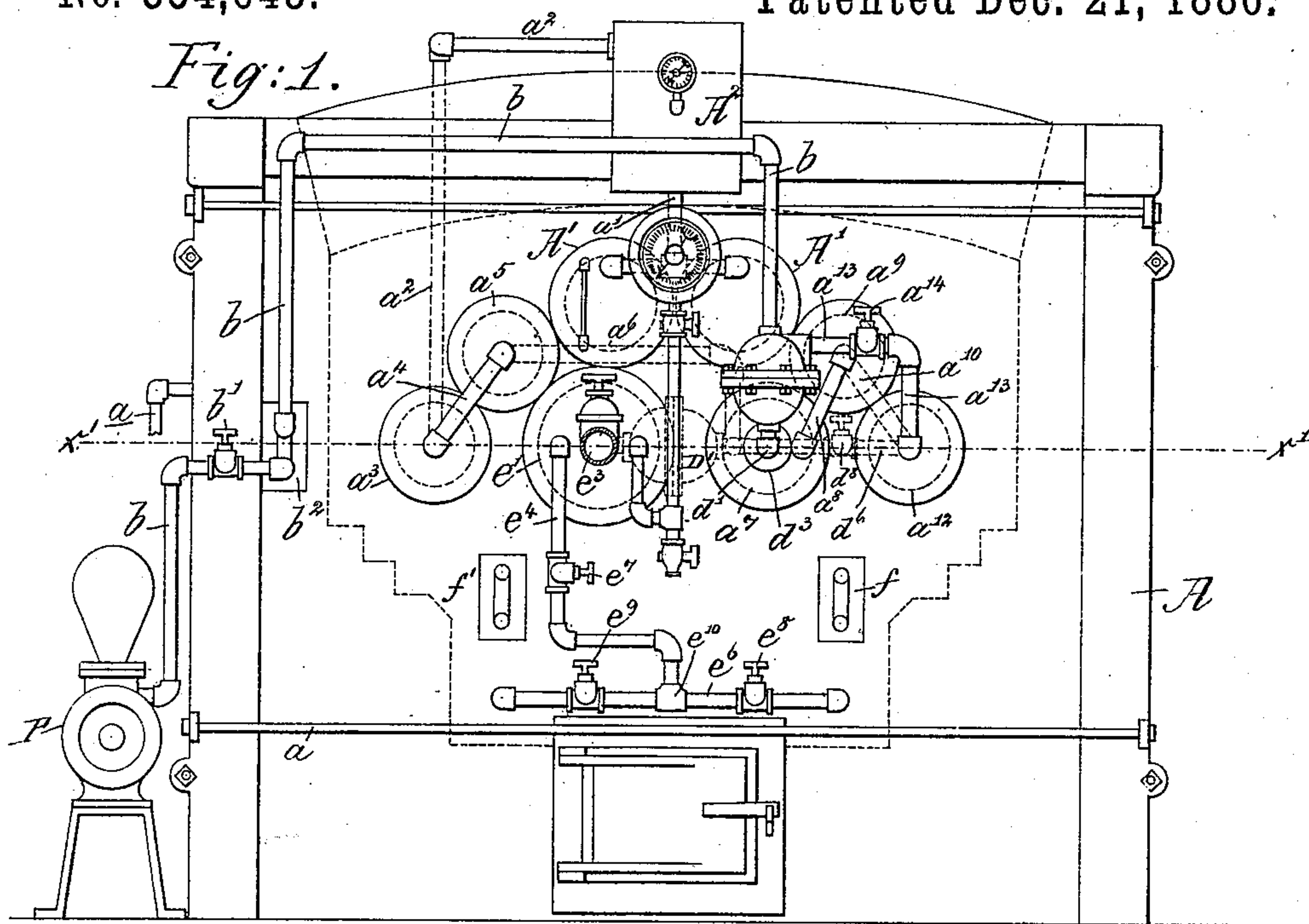
(No Model.)

2 Sheets—Sheet 1.

J. N. MAHER.  
VAPOR FUEL GENERATOR.

No. 354,643.

Patented Dec. 21, 1886.



Witnesses.  
Arthur Gifford.  
John F. C. Prindle.

Inventor.  
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By Crosby & Gregory attys.



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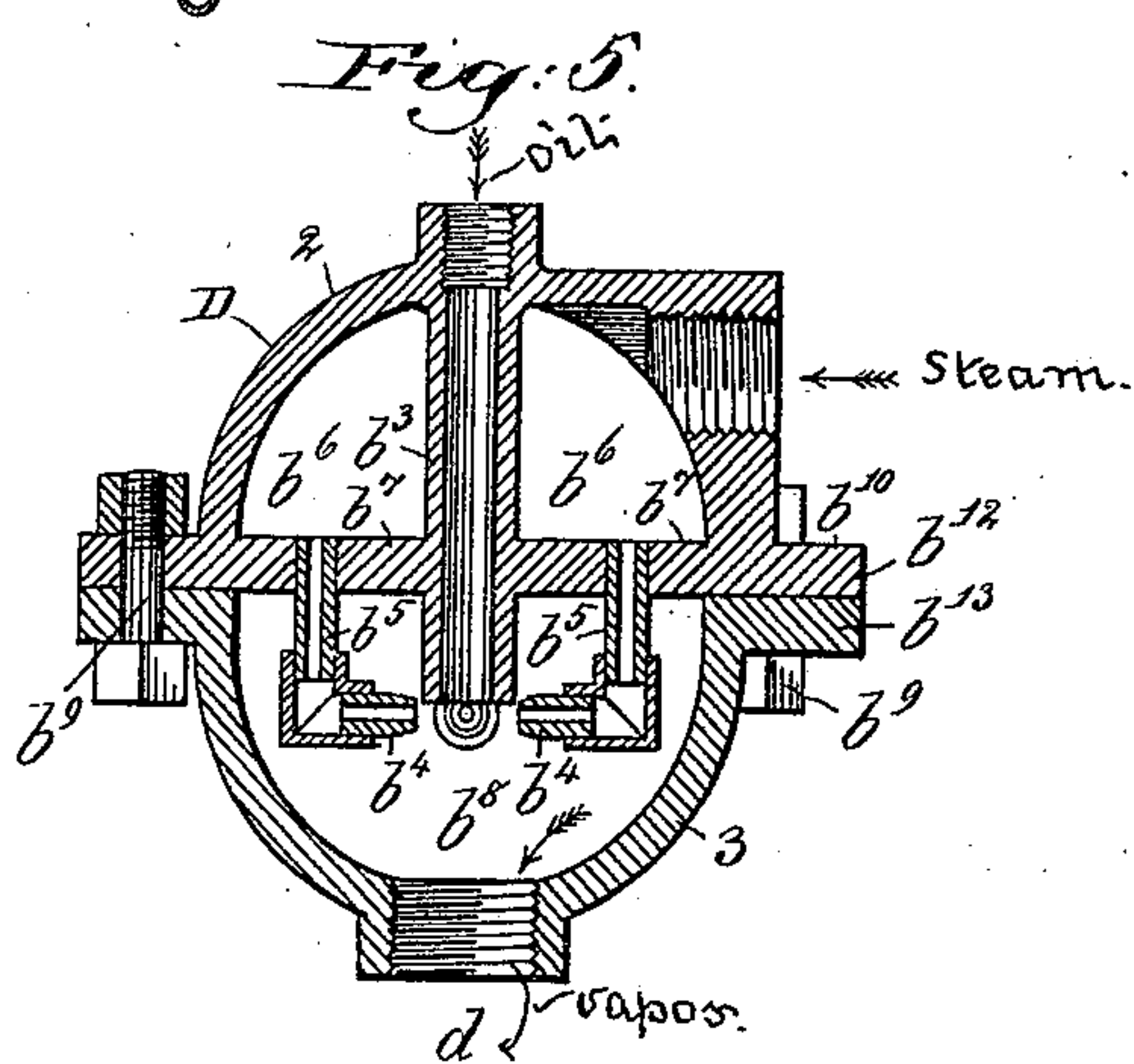
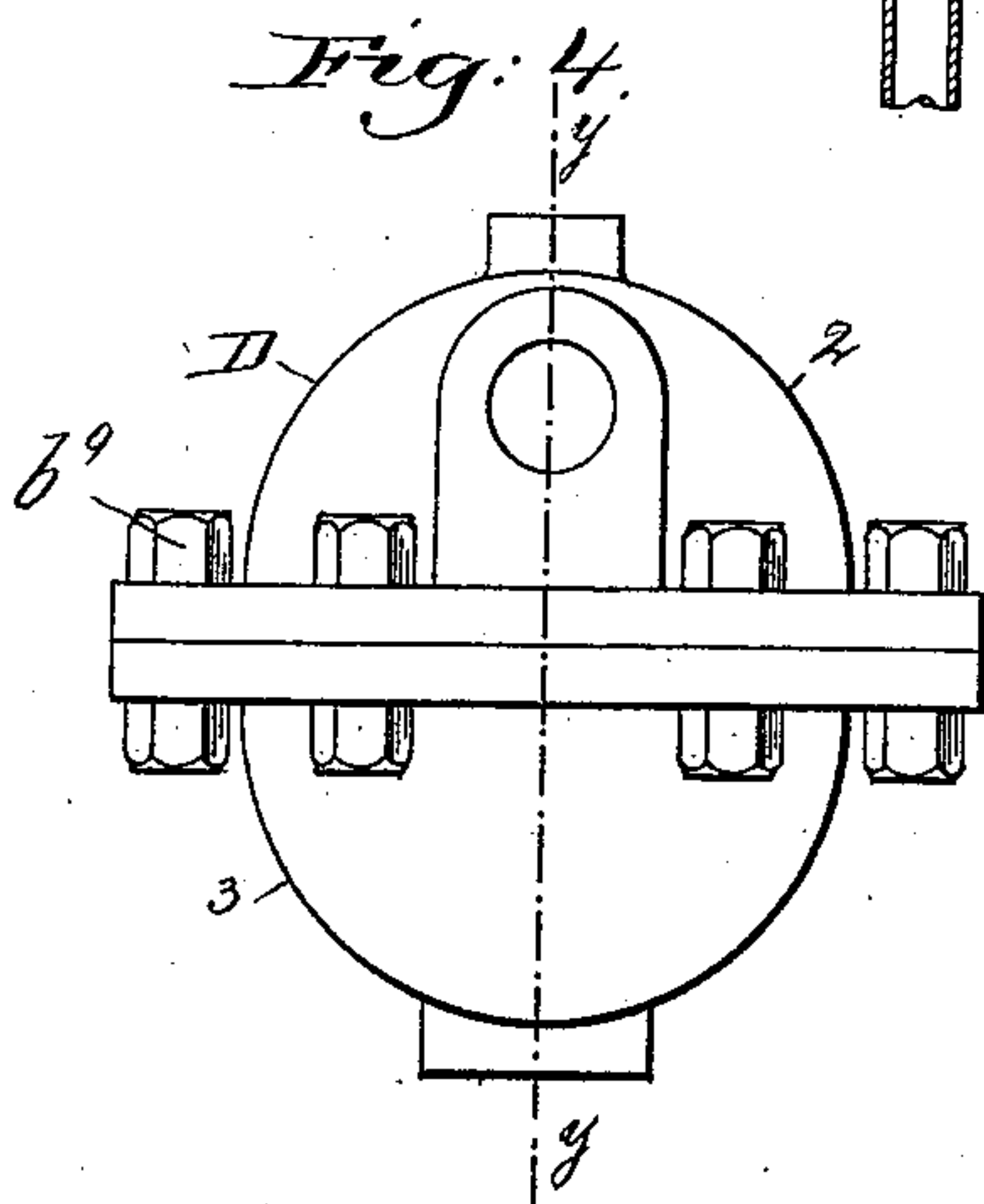
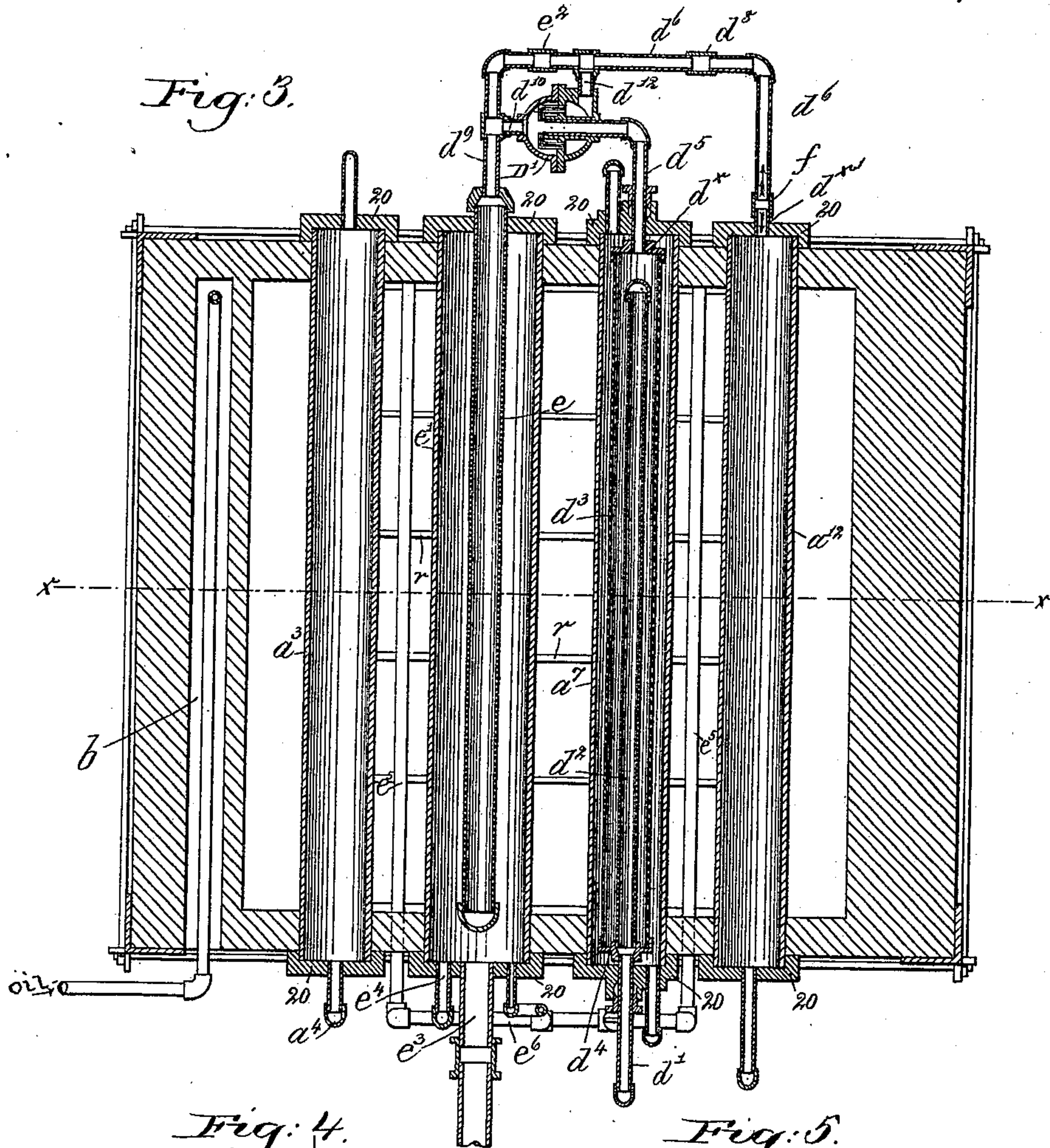
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John F. C. Prinsbeck

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John N. Maher.  
by Leroy S. Gregory, atty.



# UNITED STATES PATENT OFFICE.

JOHN N. MAHER, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO GEORGE GOGIN, OF SAME PLACE.

## VAPOR-FUEL GENERATOR.

SPECIFICATION forming part of Letters Patent No. 354,643, dated December 21, 1886.

Application filed December 14, 1885. Serial No. 185,601. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN N. MAHER, of Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Vapor-Fuel Generators, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to vapor-fuel generators; and it consists, essentially, of a furnace containing a gas-receiver, a mixing-chamber or generator, and superheaters supported in suitable manner within the said furnace, the said furnace also containing boilers in which steam is generated, the steam being subsequently superheated on its way to the atomizers, and a mixing-chamber or generator and a gas-receiver, the said boilers being in communication with one another by suitable pipes.

The oil or other volatile hydrocarbon to be used is supplied to an atomizer which has superheated steam led into it to atomize the oil, the said oil and superheated steam entering the mixing-chamber or generator in the form of a vapor, and thereafter the said vapor is passed through a second atomizer, where it is converted into gas and delivered into a receiver, from which it is led away for use.

My invention also consists in details of construction, to be hereinafter specifically pointed out and claimed.

Figure 1 in vertical elevation shows sufficient portion of an apparatus to enable my invention to be understood; Fig. 2, a vertical section of Fig. 3 on the dotted line  $xx$ ; Fig. 3, a horizontal section of Fig. 1 in the line  $x'x'$ ; Fig. 4, an elevation of an atomizer, and Fig. 5 a section of Fig. 4 in the line  $yy$ .

The furnace A, constructed of brick-work or other suitable and usual material, is of proper shape to contain the parts to be described.

The boilers A', connected together and herein shown as having their ends projecting through and supported in suitable openings in the front and rear ends of the furnace, are supplied with water through a pipe,  $a$ , (see Fig. 2,) communicating with any usual source of supply outside the furnace, the said pipe passing along the rear of the brick-work, as shown by dotted lines in the said figure, the water fed to the said

boilers being converted into steam by heat furnished in a manner to be hereinafter described.

The steam generated in the boilers A' is led by a pipe,  $a'$ , (see Fig. 1,) into a steam-dome, A<sup>2</sup>, from which it is conducted by the pipe  $a^2$  into a cylinder,  $a^3$ , forming one of a series of superheaters, in which the steam from the boilers A' is superheated.

The superheater  $a^3$  is connected by a pipe,  $a^4$ , at its front end with the superheater  $a^5$ , which is joined at its rear end by the pipe  $a^6$ , (shown by dotted lines, Figs. 1 and 2,) with the superheater  $a^7$ , containing a mixing-chamber or generator,  $a^8$ , to be described, the said superheater being joined at its front end by the pipe  $a^8$ , with the superheater  $a^9$ , connected at its rear end by the pipe  $a^{10}$  (see dotted lines, Fig. 1) with the superheater  $a^{12}$ , which is joined at its front end with an atomizer, D, by a pipe,  $a^{13}$ , provided with a valve,  $a^{14}$ , to regulate the admission of superheated steam into the said atomizer D, the said boilers and superheaters being provided with suitable heads or caps, 20, and being substantially alike.

The oil to be atomized is forced, by means of a pump, P, situated outside the furnace, through a pipe,  $b$ , provided with a cock,  $b'$ , to control the amount of oil supplied by the said pump. A portion of the pipe  $b$  enters a flue,  $b^2$ , in the wall of the furnace, where it is subjected to heat, so that the oil circulating through the said pipe becomes moderately heated. The moderately-heated oil, forced onward by the pump P, enters and flows through the nozzle  $b^3$ , herein shown as forming an integral part of the upper half, 2, of the atomizer D, as shown in Fig. 5.

The upper half, 2, of the atomizer is provided with a bottom plate,  $b^7$ , to thus form a steam-chamber,  $b^6$ , and the half 3 of the atomizer is so shaped and joined to the upper half, 2, as to form a vapor-chamber,  $b^8$ , the two halves being joined by bolts  $b^9$ , extended through flanges  $b^{12}$   $b^{13}$  of the said halves, respectively.

Superheated steam conducted from the superheater  $a^{12}$  by the pipe  $a^{13}$  into the steam-chamber  $b^6$  of the atomizer D passes from the said chamber into the chamber  $b^8$ , through pipes  $b^5$ , provided with nozzles  $b^4$ , the said



pipes being placed on opposite sides of the nozzle  $b^3$ , and having their nozzles in close proximity to the mouth of the nozzle  $b^3$ , as shown in Fig. 5, so that as the heated oil issues from the mouth of the nozzle  $b^3$  it is vaporized by the superheated steam issuing from the nozzles  $b^4$ . The vaporized oil passes from the chamber  $b^8$  out through the port  $d$  and the short pipe  $d'$  (see Figs. 1 and 3) into a perforated pipe,  $d^2$ , placed within the mixing-chamber or generator  $d^3$ , made as a pipe, and provided with suitable heads,  $d^4$   $d^x$ , as shown in Fig. 3, the vaporized oil and superheated steam being thoroughly mixed therein. The mixed vaporized oil and steam pass from the mixing-chamber  $d^3$  through the small pipe  $d^5$ , at the rear of the furnace, into a second atomizer,  $D'$ , constructed like the atomizer  $D$ , the said mixture of vaporized oil and steam being subjected to the action of superheated steam, in this instance taken from the superheater  $a^{12}$  by the pipe  $d^6$ , provided with a T-piece,  $f$ , having its ends connected, respectively, with the pipe  $d^6$  and a small pipe,  $d^{x'}$ , leading to the superheater  $a^{12}$ , the pipe  $d^6$  being provided with a valve or cock,  $d^3$ , by which to regulate the admission of superheated steam to the atomizer  $D'$ .

The pipe  $d^6$  is connected to a pipe,  $d^9$ , which communicates with the outlet-pipe  $d^{10}$  of the atomizer  $D'$ , (see Fig. 3,) and leads into a larger perforated pipe,  $e$ , within a receiver,  $e'$ , the pipe  $d^6$  having a second valve or cock,  $e^2$ , beyond the inlet-pipe  $d^{12}$  (see Fig. 3) of the atomizer  $D'$ , and by means of which valve the vapor from the atomizer may or may not, as desired, be acted upon by an additional amount of superheated steam conducted around the said atomizer by the pipe  $d^6$ . The mixture of oil and superheated steam in a highly-gaseous state passes from the perforated pipe  $e$  into the receiver  $e'$ , where it becomes thoroughly commingled, and from whence it is led by the pipe  $e^3$  to the furnace, or the place where it is to be used as fuel.

The pipe  $e^4$  (see Fig. 1) conveys a portion of the gas within the receiver  $e'$  to burners consisting of pipes  $e^5$ , (see Fig. 3,) joined to a main pipe,  $e^6$ , (see Figs. 1 and 3,) and provided with perforations upon one side, through which the gas issues into the furnace, as represented at  $g^x$  in Fig. 2, the said gas on ignition supplying the heat by which more gas is generated, the pipes  $e^5$  being supported in suitable manner by rails  $r$ .

The pipe  $e^4$  is provided with a cock,  $e^7$ , to control the supply of gas to the burners, and the pipe  $e^6$  with cocks  $e^8$   $e^9$ , one on each side of the T-piece  $e^{10}$ , joining the pipe  $e^4$  to the pipe  $e^6$ , to control the number of burners to be used and the amount of gas consumed by each burner.

To start the apparatus in operation, I employ two small pipes,  $f f'$ , (see Fig. 1,) perfo-

rated at one side and supplied with oil from any convenient source outside the furnace, and not herein shown, the ignition of the raw oil producing sufficient heat to generate gas, which is then ignited, and continues the further generation of gas, as above described, the preliminary heaters  $f f'$  being withdrawn after the apparatus has been started in operation.

Instead of generating the steam in the boilers  $A'$ , it may be generated outside the furnace, and be conveyed to the superheater  $a^3$ , thus doing away with the boilers  $A'$ ; but in practice I prefer the construction shown in the drawings.

I claim—

1. In an apparatus for generating vapor-fuel, one or more superheaters combined with one or more atomizers to receive superheated steam and oil, and provided with nozzles in which said oil is vaporized, and a mixing-chamber or generator in which to mix the vapor and steam, and a receiver in which to receive the generated gas, substantially as described.

2. The water-boilers  $A'$  and superheating-boilers communicating with the said water-boilers, and one or more independent atomizers to receive superheated steam and oil, and in which the said oil is vaporized, combined with a gas-receiver and with burners fed by gas from the said receiver, substantially as described.

3. The boilers  $A'$  and superheaters communicating with the said boilers, one or more atomizers to receive superheated steam and oil, and in which the said oil is vaporized, a gas-receiver and burners fed by gas from the said receiver, combined with a pump to feed oil to the atomizer  $D$ , and a heater, substantially as described, to moderately heat the oil on its way to the said atomizer, substantially as described.

4. The boilers  $A'$ , steam superheaters, the atomizer  $D$ , combined with the mixing-chamber  $d^3$ , the atomizer  $D'$ , gas-receiver  $e'$ , and burners  $e^5$ , substantially as described.

5. The combination of the boilers  $A'$ , steam-dome  $A^2$ , superheaters, atomizer  $D$ , mixing-chamber or generator  $d^3$ , atomizer  $D'$ , gas-receiver  $e'$ , burners  $e^5$ , with the preliminary heaters  $f f'$ , substantially as described.

6. The atomizer consisting of the parts 2 3, bolted together, the plate  $b^7$ , to form chambers  $b^6$   $b^8$ , oil-nozzle  $b^3$ , the nozzles, substantially as described, to conduct superheated steam from the chamber  $b^6$  to the chamber  $b^8$ , as and for the purpose specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN N. MAHER.

Witnesses:

G. W. GREGORY,  
J. H. CHURCHILL.