

(No Model.)

T. HENDERSON & W. A. STAPP.
GAS GENERATOR.

No. 551,546.

Patented Dec. 17, 1895.

Fig. 1.

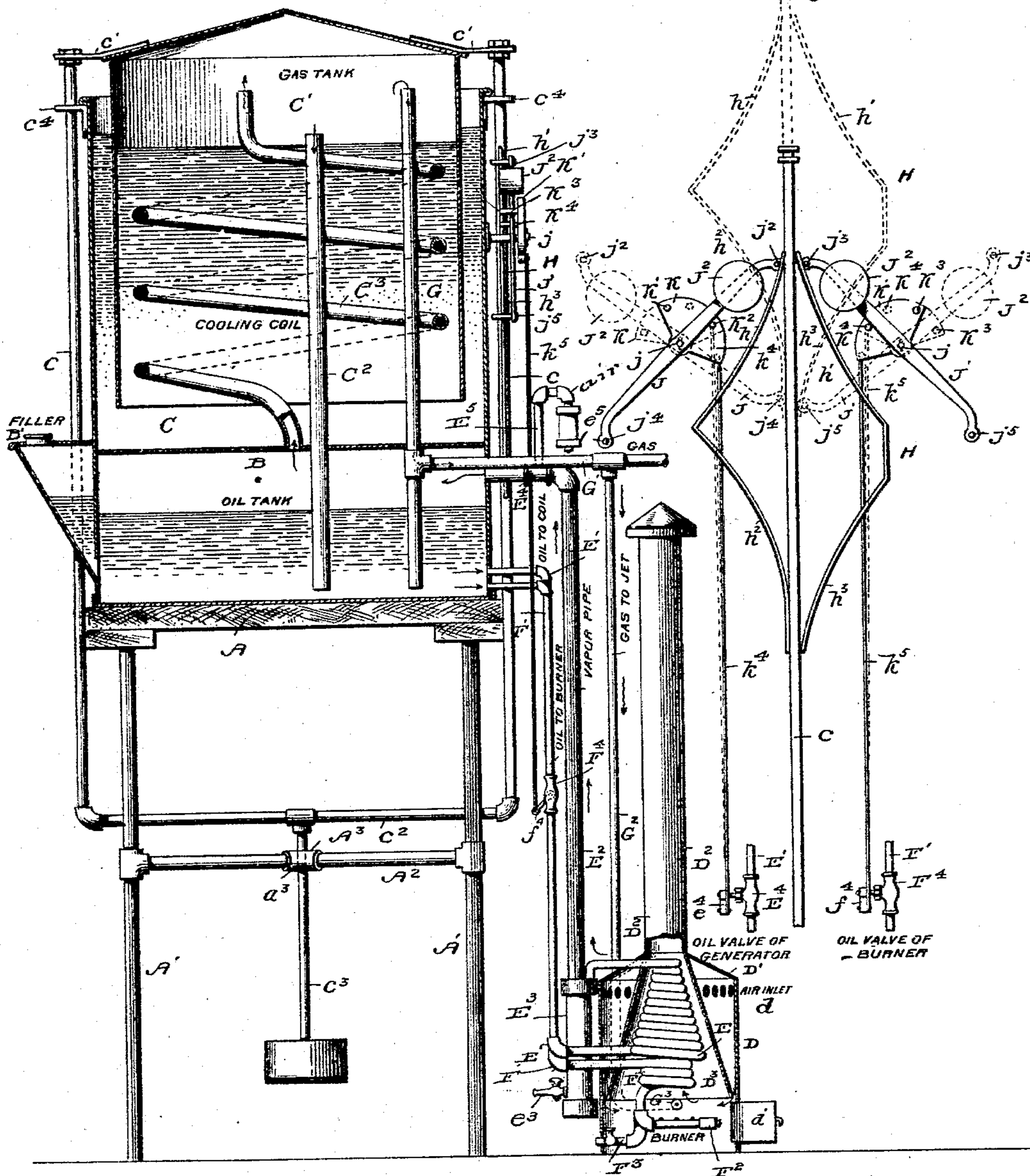


Fig. 2.

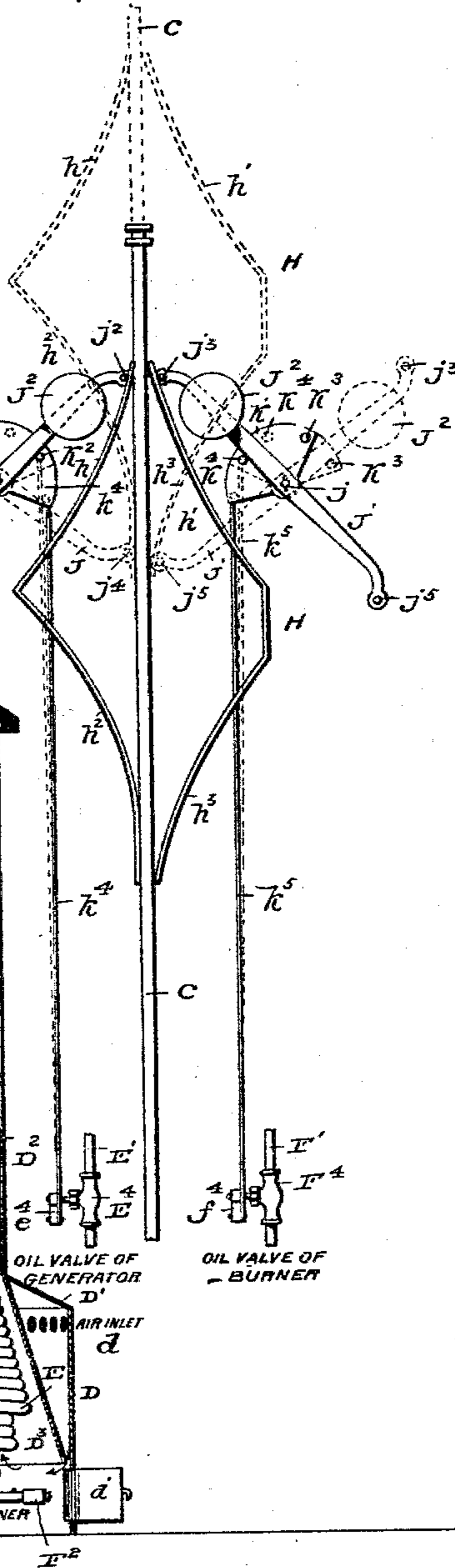
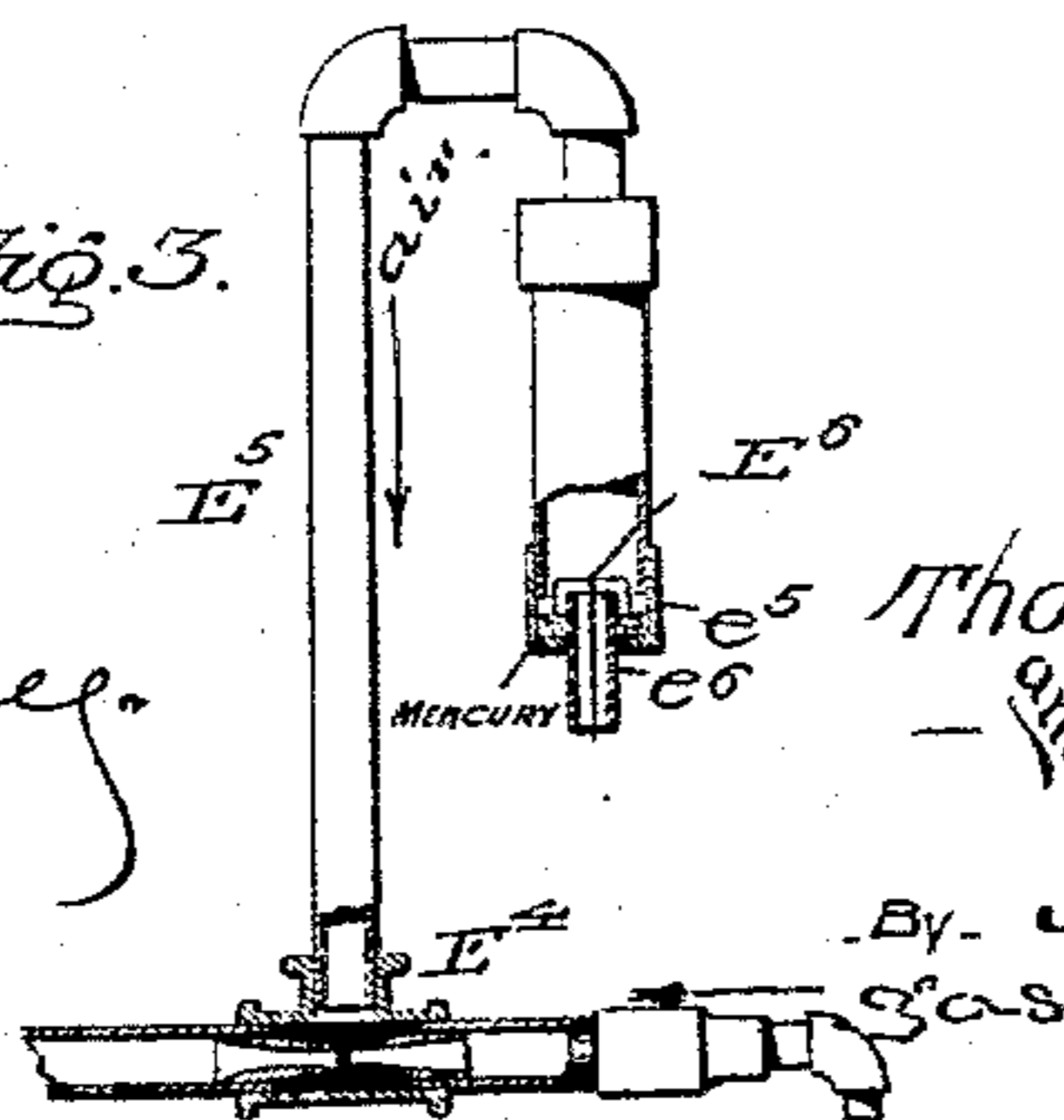


Fig. 3.



Witnesses

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UNITED STATES PATENT OFFICE.

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GAS-GENERATOR.

SPECIFICATION forming part of Letters Patent No. 551,546, dated December 17, 1895.

Application filed May 15, 1895. Serial No. 549,452. (No model.)

To all whom it may concern:

Be it known that we, THOMAS HENDERSON and WILLIAM A. STAPP, of Tyler, Smith county, Texas, have invented certain new and useful Improvements in Automatic Oil-Gas Generators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, in which—

Figure 1 is a sectional side elevation of the apparatus, and Fig. 2 is a side elevation of the automatic cut-off mechanism, which controls the flow of oil to the burner and retort or generator. Fig. 3 is a detail showing the air-injecting mechanism.

Our invention relates to that class of apparatus in which kerosene or crude petroleum is converted by heat into a gas for heating or illuminating purposes and stored in a suitable gasometer or tank.

The object of the invention is to provide such an apparatus which will be entirely automatic in its action so long as the supply of oil is kept up and thereby render the use of weights and winding apparatus unnecessary; also to render the apparatus simple and compact, so as not to be liable to get out of order.

The invention will be first described and then specifically pointed out in the claims.

A represents a platform mounted on suitable supports A', connected by cross-braces A², these braces being connected at their point of intersection by a cruciform union A³ having an aperture a³ for a purpose to be hereinafter described.

B is the oil tank or reservoir mounted on the platform A and having a suitable filling-opening B' at one side. The top of the oil-tank B forms the bottom of the gas-tank C, which is filled with water, as usual, in which is sealed the bell C' which forms the upper portion of the said gas-tank, the said bell being adapted to rise and fall as the pressure of gas increases and decreases respectively. The bell C' is guided in its vertical movement by means of the parallel rods c c, which are secured at their upper ends to ears c' c' projecting from opposite sides of the upper end of the bell and extend down outside of the tank to a point below the platform A, where they are connected by a cross-piece c² provided with a central depending guide-rod c³, which passes through the guide-aperture a³

before described and is provided at its lower end with one or more weights. The rods c c are guided in the ears c' c' on the tank C.

The gas-tank C is connected just above its water-level with the oil-tank below the oil-level by means of a pipe C², which will conduct back into the oil-tank any oil resulting from condensation and floating on top of the water, and a cooling-coil C³ connects the top of the oil-tank with the top of the gas-tank so that the heated gas which passes over the oil and up through the coil C³ will be cooled before it reaches the upper part of the gas-tank, as will be readily seen.

D is the generator proper, in which the oil is converted or generated into gas and conveyed into the upper part of the oil-tank B, as will presently appear. This generator comprises an outer casing D', having air-inlets d around its upper end, a door d' at its lower end, a central chimney D² on top and a conical jacket D³, registering at its apex with the lower end of the chimney and spaced at its lower open end or base away from the casing D', so as to allow the air to pass down into the lower end of the casing. Within the conical jacket are arranged two retorts E F, formed of coiled tubes or pipes, the upper gas-generating retort or coil E being connected at its lower end by a pipe E' with the lower end of the oil-tank B, so as to be supplied with oil therefrom, and said gas-generating retort or coil is connected at its upper end with the upper end of the oil-tank above the oil-level by means of the vapor or gas pipe E². The lower end of the vapor or gas pipe is provided with a tar-trap E³, provided at its lower end with a cock e³, adapted to discharge the tar accumulating therein into any suitable receptacle. The vapor or gas pipe E² adjacent to where it enters the oil-tank B is provided with an air-injector E⁴, into which discharges the lower end of one arm of air-inlet pipe E⁵, the other depending arm of said pipe being provided with a mercury-cup e⁵, having a valve-seat e⁶, over which fits the light aluminum valve E⁶ in the form of an inverted cup. The lower edge of this valve is sealed in the mercury and the valve-stem extends down through the short open-ended tube, which forms the valve-seat. The flow of gas through the pipe E² will cause the in-

jector to draw air through pipe E^5 , the suction causing valve E^6 to be raised; but when the flow of gas through pipe E^2 ceases then the back-pressure will firmly close valve E^6 .

5 The burner coil or retort F is provided with any suitable form of hydrocarbon-burner F^2 directly under it. The burner is provided with a valved pipe F^3 , in which collects any heavy distillates or residue which may be
10 drawn off from time to time.

G is the gas-pipe for conveying the gas from the tank to different parts of a building. This pipe G extends from the upper part of the gas-tank down into the oil-space within
15 the oil-tank and has a lateral branch G' extending out therefrom above the oil-level, so that any oil of condensation in the gas-pipe will be returned to the oil-tank. The branch pipe G' is tapped by a smaller pipe G^2 , which
20 leads to a small gas-jet G^3 , placed adjacent to the burner F^2 and kept lighted at all times.

The two oil-pipes $E' F'$ are provided with valves $E^4 F^4$ at opposite sides of one of the guide-rods c , and said valves are provided
25 with crank-arms $e^4 f^4$, respectively. These crank-arms are operated automatically by the rise and fall of the bell C' by our improved automatic cut-off or regulating mechanism, which is constructed as follows:

30 H is an approximately diamond-shaped cam, secured to the said guide-rod c , the two upper sides $h h'$ of which cam are of the same length, while the lower sides $h^2 h^3$ are of unequal lengths, the side h^3 being the shorter
35 and connected to the upper side h' by a straight portion to obviate a break. At opposite sides of this cam H are two centrally-pivoted levers $J J'$, which are mounted on short posts $j j$ projecting from the gas-tank
40 C and each provided with a counter balance or weight J^2 above its axis. The upper ends of these levers $J J'$ are provided with transverse pins or projections $j^2 j^3$, which engage the upper sides $h h'$ of the cam H , while the
45 lower ends of said levers are provided with similar pins or projections $j^4 j^5$, which in their turn engage the lower sides $h^2 h^3$ of the said cam.

$K K$ are segments or bell-cranks pivoted
50 on the posts $j j$ in front of the levers $J J'$ and are each provided with two pins $K' K^2$ and $K^3 K^4$, respectively, which lie in the path of the said levers so as to be struck thereby in the two movements thereof, as will presently
55 appear. The adjacent ends of these pivoted segments or bell-crank levers are connected with the respective valve-arms or cranks $e^4 f^4$ by means of connecting-rods $k^4 k^5$.

The parts being in the position shown in
60 full lines in the drawings, the operation is as follows: The gas at jet G^3 is ignited and in turn will light the burner F^2 , it being understood that the valves $E^4 F^4$ are now open to admit oil to the gas generating and burner
65 coils or retorts $E F$. The flame from the burner will heat the coil or retort F so that the oil supplied to the burner will be vapor-

ized, and this burning vaporized fluid will soon raise the temperature of the gas-generating coil E to a red heat, which will rapidly
70 convert the oil supplied thereto through pipe E' into gas, which passes up through pipe E^2 into the oil-reservoir B , where it is enriched in passing over the upper surface of the oil therein, air being admitted through pipe E^5 .
75 From the oil-reservoir B the gas passes up through the cooling-coil C^3 into the bell C' , from which it is drawn through pipe $G G'$. As the gas-tank fills, its bell C' rises and this causes the cam H to move upwardly with the
80 guide-rod c , the upper sides $h h'$ gradually forcing the upper ends of the levers $J J'$ outward till the pins $j^2 j^3$ reach the lower ends of said sides $h h'$. At this time the gas-tank will have become full of gas, so that the supply
85 must cease, and just at this moment the levers $J J'$ will have been forced outward past the center of gravity and their weights will suddenly throw their upper ends outward, causing said levers to strike the outer pins
90 $K' K^3$ of the bell-cranks or segmental levers $K K'$ and rock said levers, causing them to pull upward on rods $k^4 k^5$, thereby closing both valves $E^4 F^4$ and cutting off the supply
95 of oil to the generator and burner coils or retorts $E F$. The cut-off mechanism will now be in the position shown in dotted lines, Fig. 2—that is to say, the position of the levers $J J'$ and bell cranks $K K'$ will be reversed, the
100 lower ends of said levers now engaging the lower ends of the sides $h^2 h^3$ of the cam H and the said parts will remain in this position until the gas is being used from pipe G' . As the pressure decreases in the gas-tank, the
105 bell C' begins to descend, and when it reaches a predetermined point the upper end of the side h^3 of cam H will have caused the lever J' to tilt and reverse, thereby striking the pin K^4 , causing it to rock bell-crank or segment
110 K' and opening the valve F^4 to supply oil to the burner and its coil, which will be at once lighted from jet G^3 to heat the gas-generating retort or coil E , and as the bell continues to descend the upper end of the side h^2 of cam H will cause the lever J to tilt and reverse,
115 thereby striking the pin K' of the segment or bell-crank and causing it to pull on rod k^4 and open the valve E^4 to admit oil to the gas-generating retort or coil E , where it will be immediately vaporized and conducted to the
120 gas-tank to again raise the bell. Thus the operation will continue in a perfectly-automatic manner. The apparatus therefore only requires occasional inspection, as no weights or other setting mechanisms have to be wound.
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The burner being confined in a closed casing, there can be no danger from fire, and the two retorts or coils being confined one above the other in the conical jacket may be heated at a very small outlay.

130 Having thus described our invention, what is claimed is—

1. In a gas generator, the combination with the gas tank having a bell and a gas generat-

ing retort having a valved oil supply, of a vertical rod carried by the bell and provided with a cam having upper and lower inclines, and a centrally pivoted vertically rocking counterbalanced lever the ends of which are adapted to alternately engage the respective inclines for reversing said lever, and mechanism in the path of said lever for operation in opposite directions thereby and connected with the oil pipe valve for opening and closing the same, substantially as set forth.

2. In a gas generator the combination with the gas tank having a bell, a gas generating retort having a valved oil supply and a pipe connecting it with the gas tank and a burner also having a valved supply pipe, of a vertical rod carried by the bell and provided with an approximately diamond shape cam, centrally pivoted vertically rocking counterbalanced levers at opposite sides of the cam to alternately engage the upper and lower inclines at the opposite sides of the cam with their opposite ends and be reversed thereby, and mechanisms in the paths of said two levers for operation thereby in opposite directions and in turn connected with the valves of the gas generator and burner supply pipes, substantially as set forth.

3. In a gas generator, the combination with the gas tank having a bell and a gas generating retort having a valved oil supply, and a pipe leading from the said retort to the gas tank, of a vertical rod carried by the bell and provided with a cam having an upper and a lower inclined side a centrally pivoted rocking lever the ends of which are adapted to alternately engage the respective inclines, a bell crank or segment having two pins between which said lever works to throw said bell crank in opposite directions and a rod connecting the bell crank or segment with said valve for opening and closing the same, substantially as and for the purpose set forth.

4. The combination with the rod having the four sided cam and means for raising and lowering the rod, of tilting levers at opposite sides of the cam and adapted to be overbalanced by the cam in its upward movement to cause their lower ends to engage the two lower sides thereof and the downward movement of the cam serving to reverse the said levers, bell cranks or segments having pins or lugs projecting at opposite sides of the levers in the paths thereof and connecting rods leading from the bell cranks or segments to the valves to be operated, substantially as and for the purpose set forth.

5. The combination with the rod having a four-sided cam, one of the lower sides being shorter than the other, and means for raising and lowering the rod, of the centrally pivoted levers at opposite sides of the cam with their opposite ends adapted to alternately engage said cam as it is moved up and down to overbalance or reverse the positions of said levers, bell cranks or segments, pivoting on the lever axes and having pins or lugs at opposite

sides of said levers and in the paths thereof for rocking the bell cranks or levers in opposite directions, and rods for connecting said bell cranks or segments with the valves; the lever acted on by the short side of the cam being thereby actuated in advance of the other lever, substantially as and for the purpose set forth.

6. In a gas apparatus the generating mechanism comprising the outer casing apertured near its upper end, a conical open ended jacket within and of a less height than the casing, spaced therefrom at its lower open end and registering at its upper end with the chimney or offtake, the gas generating coil or retort in the said jacket, and having an oil supply pipe and a gas offtake pipe, the burner retort or coil in the lower end of the jacket under the first named coil or retort and having an oil supply pipe leading into its upper end and a burner at its lower end for heating both coils or retorts, substantially as and for the purpose set forth.

7. The combination of a gas tank and a bell, of guide rods depending from the bell and having a cross bar uniting their lower ends beneath the tank, a rod depending from the cross bar and provided with a weight and guides for said guide rods, substantially as set forth.

8. In a gas apparatus, the oil tank having a superposed gas tank and a pipe for supplying the generator and a bell sealed in the liquid contained in the gas tank, in combination with a gas supply, pipe discharging into the oil tank above the oil level, a cooling coil extending from top of oil tank into the gas tank above the level of the fluid therein, a condensation pipe extending from the fluid level of the gas tank down into the oil tank, and a vertical gas offtake pipe extending from within the bell down into the oil and provided with a distributing branch, substantially as set forth.

9. A gas apparatus comprising the oil tank, the superposed gas tank having a bell provided with a depending rod having a diamond or four sided cam, a pipe for conducting the gas from the tank, a generating mechanism below the said two tanks and comprising the generating retort and the burner two valved oil pipes extending down from the oil tank to the said retort and burner, a gas pipe for conducting the gas from the generating retort to the gas tank and having an air inlet, vertically rocking, centrally pivoted counterbalanced levers at opposite sides of the cam to be tilted and reversed end for end thereby, and mechanisms in the paths of said levers for reverse movements thereby and having rods connecting them with the valves in said two oil pipes, substantially as set forth.

10. A gas apparatus comprising a gas tank having a bell sealed therein, an oil tank having a cooling pipe leading from above the oil space into the upper end of the gas tank, a gas offtake or distribution pipe leading from

the gas tank, a gas generating retort or coil, having a gas or vapor pipe leading into the oil reservoir above its oil level, a burner coil or retort under the gas retort and having a
5 burner for heating both coils or retorts, valved pipes leading from the oil tank to the said two coils or generators, a branch gas pipe leading from the gas distribution pipe to a jet adjacent to said burner and a cut off or regulat-

ing mechanism connecting the bell with the said two valves for automatically closing them when the bell is raised and opening them when the bell is lowered.

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