

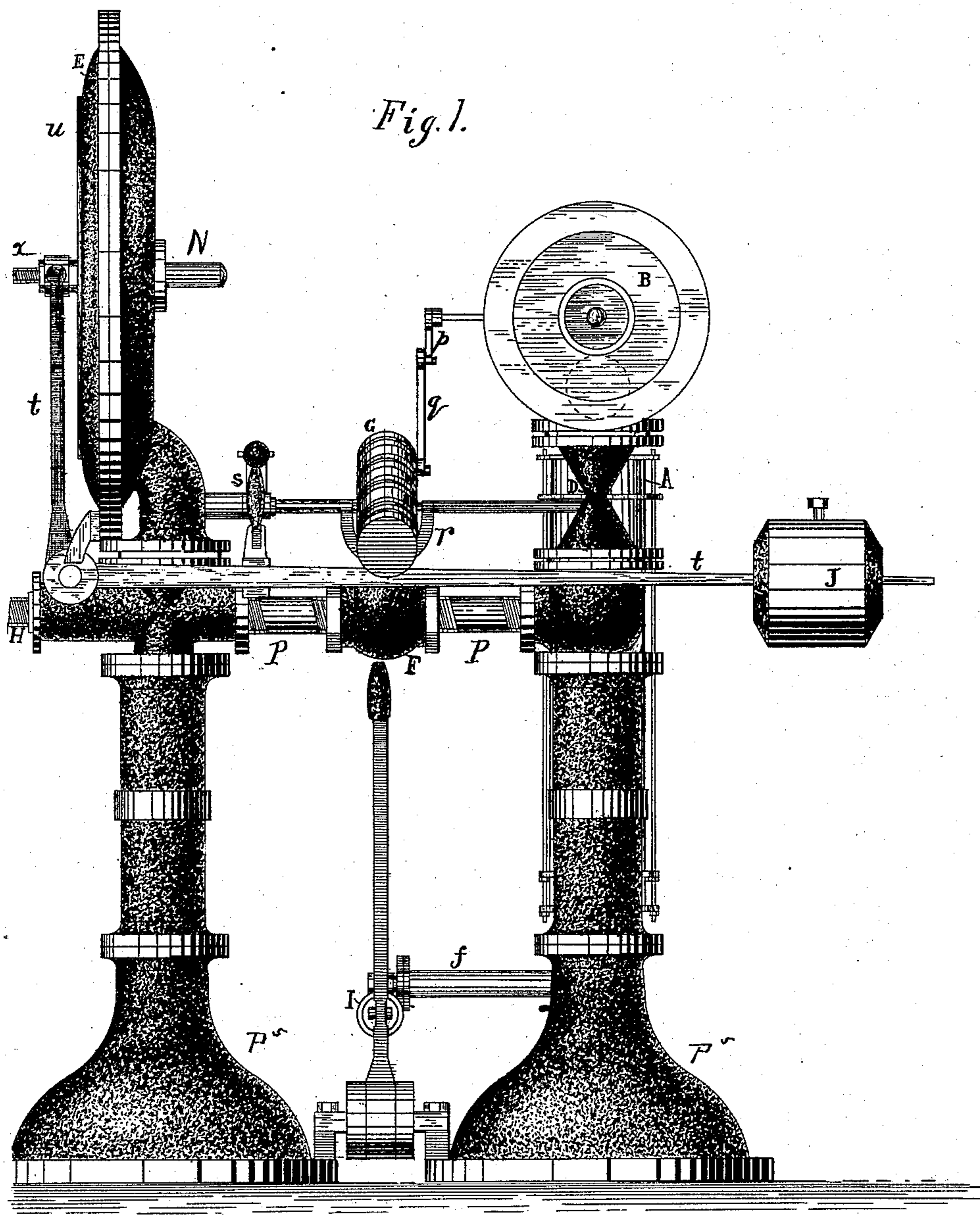
(No Model.)

3 Sheets—Sheet 1.

H. COTTRELL.
APPARATUS FOR VAPORIZING OIL.

No. 406,503.

Patented July 9, 1889.



Attest:

John Parke Wright
George H. Murray

Inventor:

Herbert Cottrell

By his Attorney,
Edward P. Thompson.

(No Model.)

3 Sheets—Sheet 2.

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Fig. 3.

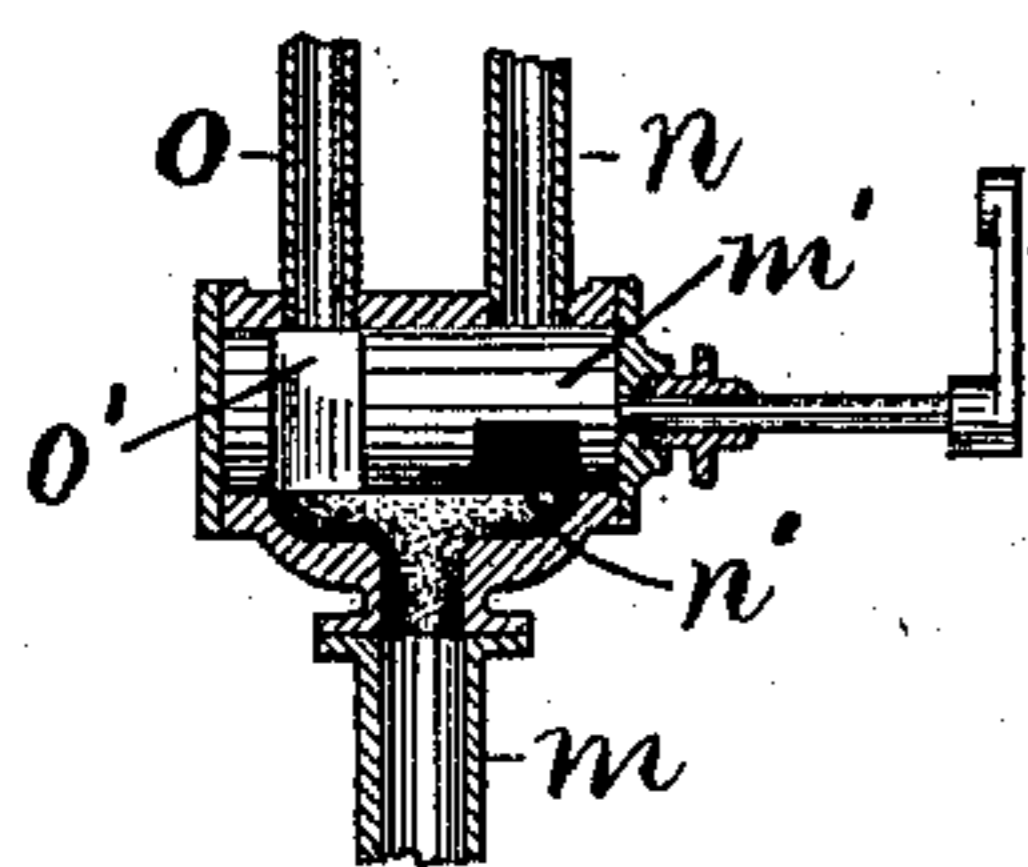
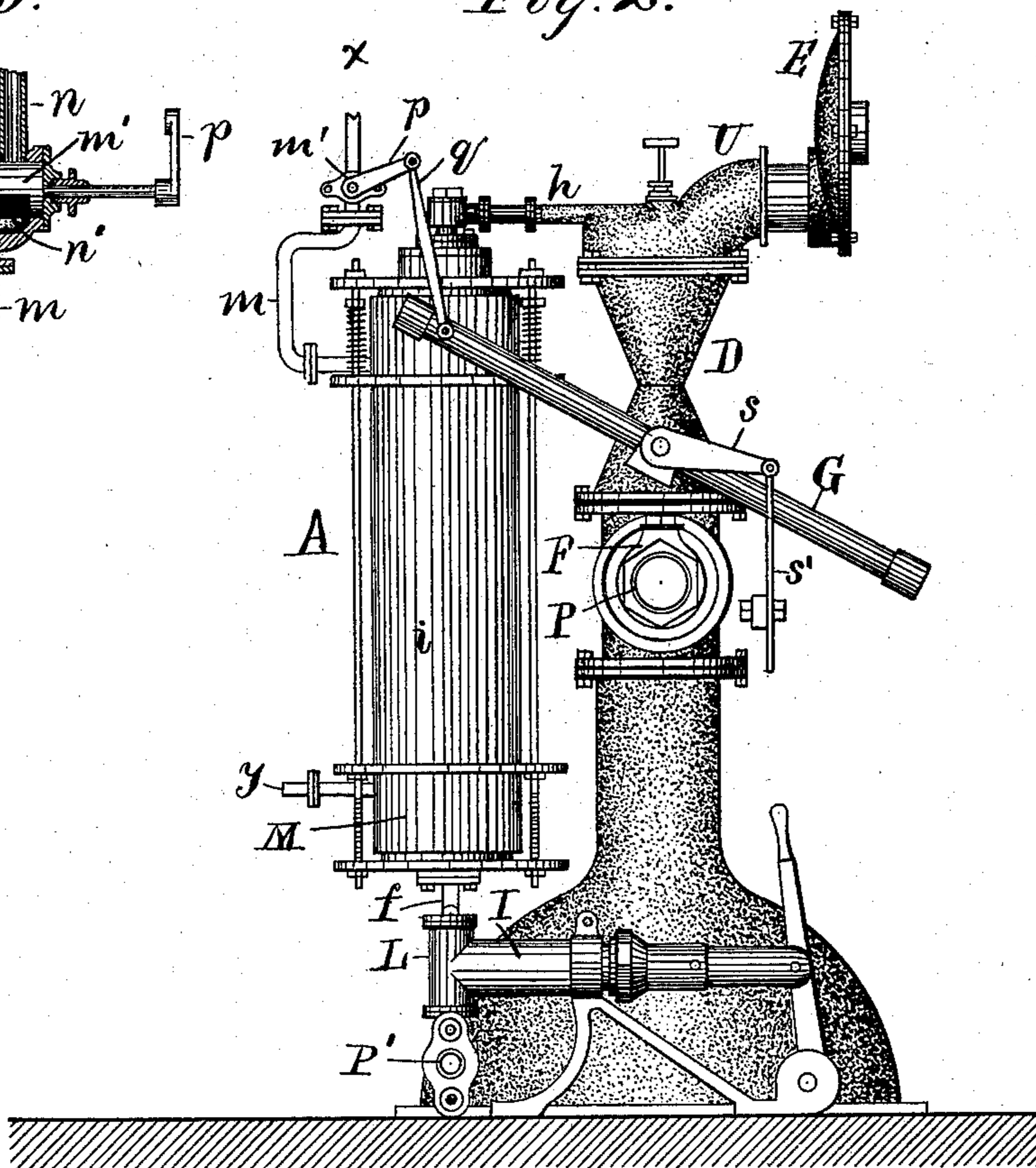


Fig. 2.



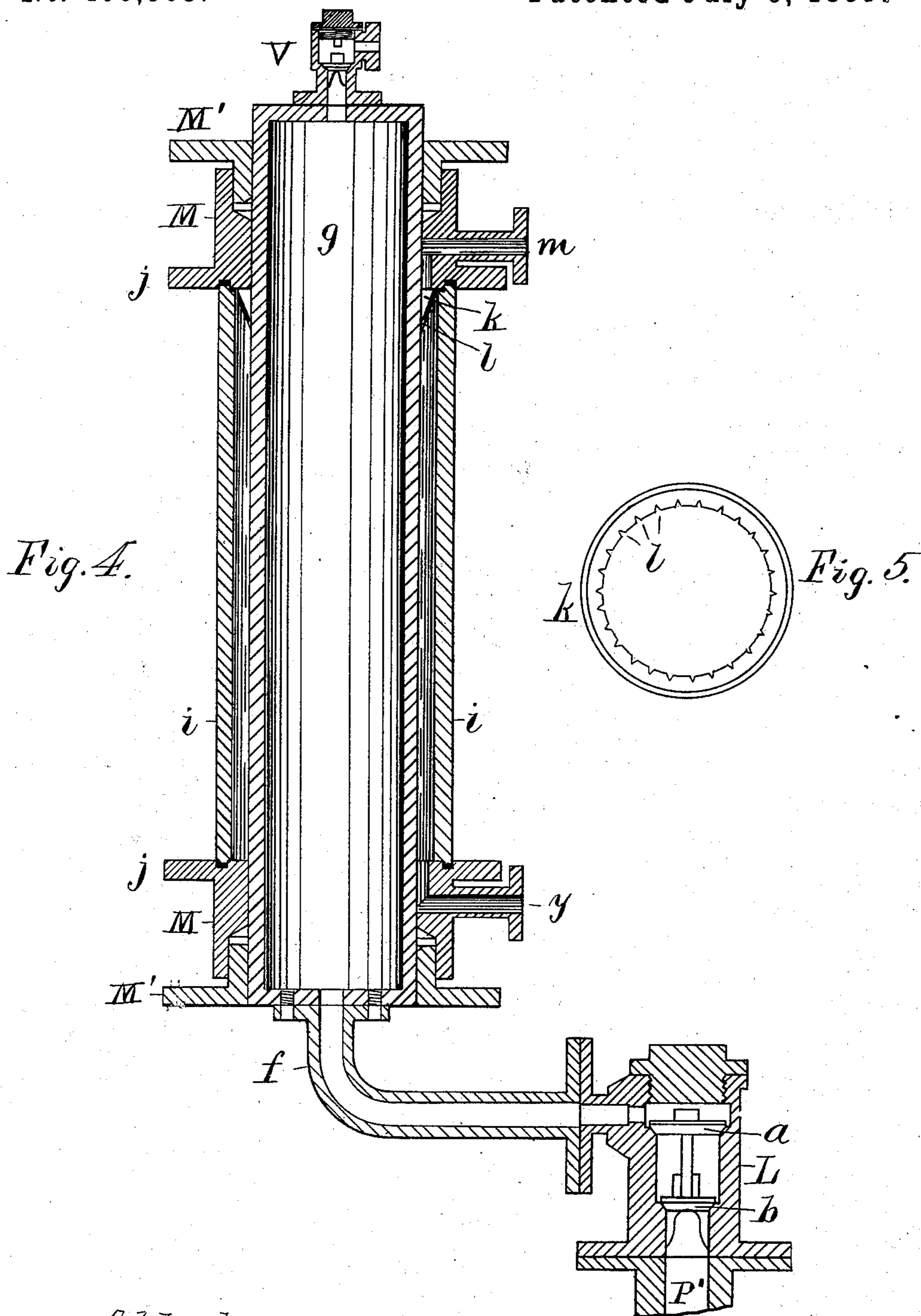
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UNITED STATES PATENT OFFICE.

HERBERT COTTRELL, OF NEWARK, NEW JERSEY.

APPARATUS FOR VAPORIZING OIL.

SPECIFICATION forming part of Letters Patent No. 406,503, dated July 9, 1889.

Application filed November 1, 1887. Serial No. 253,951. (No model.)

To all whom it may concern:

Be it known that I, HERBERT COTTRELL, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Apparatus for Vaporizing Oil, of which the following is a specification.

The apparatus referred to herein is intended to vaporize gasoline or other hydrocarbon liquids; and the object of the invention is to furnish an automatically-operated machine in which the gas-generator may serve intermittently as a vacuum-chamber to draw a suitable supply of gasoline or other liquid from an adjacent reservoir. In such construction the reservoir of liquid is placed at any convenient distance below the generator, and the liquid is drawn into the same only as required for the operations of the machine. To effect these objects, the generator is formed as a chamber having a contiguous receptacle supplied alternately with hot and cold liquid through a valve or valves shifted automatically by the movement of a gas-reservoir connected with the generator. The apparatus is provided, as in many other machines, with an inspirator for mingling air with the vaporized liquid; but my present invention relates particularly to the means for vaporizing the liquid and for supplying the vaporizing-chamber intermittently with a supply of liquid. With a reservoir located below the generator it is obviously necessary to "prime" or charge the generator with a supply of liquid to start the machine, and a pump is shown in the drawings for such purpose; but by my construction the use of a pump may be dispensed with after the machine is set in operation, as by stopping the machine with a supply of liquid in the generator it may be continuously actuated without using any pump whatever.

In the drawings, Figure 1 is an elevation of the machine viewing the edge of the receiver and the face of the inspirator inlet-valve. Fig. 2 is an elevation of the same, taken in section on line *xx* in Fig. 1, the standard with the gas-receiver being removed by such section. Fig. 3 is a section of the generator-jacket supply-valve on line *xx* in Fig. 2, but on a larger scale. Fig. 4 is a central longitudinal section of the generator and the valve-

box attached to its suction-pipe. Fig. 5 is a plan of the distributor for the generator-jacket.

The drawings represent the apparatus constructed with two pedestals *P*⁵, one of which sustains the receiver *E* and the other the inspirator *D*, while the generator *A* is sustained by pipe-connection *f* (at the bottom) to the valve-box *L* and pipe-connection *h* (at the top) to the inspirator.

The generator shown in the drawings consists in a tube or shell *g*, provided with a jacket *i*, which is fitted to the opposite ends of the generator by stuffing-boxes *M*, having glands *M'*, adapted to hold a packing to make a tight joint with the shell of the generator. The inner sides of the stuffing-boxes are grooved to fit the ends of the jacket *i*, and the stuffing-boxes are pressed toward the ends of the jacket by rods *R'*, extended through flanges *j*, formed upon the stuffing-boxes, and through the flanges of the glands *M'*. Nuts *n'* are applied to the ends of the rods to hold the casing and stuffing-boxes securely together, and provision is made for the longitudinal expansion of the jacket *i* by inserting springs *S'* between the flanges *j*, and nuts *N'*, applied upon the rods inside one of the glands. The jacket is provided with an inlet-pipe *m* and outlet-pipe *y*, the latter being preferably connected with an open waste-pipe and operating to continuously drain the jacket of its contents. The pipe *m* is provided with a supply-valve *m'*, the latter having two inlet pipes or passages *n* and *o*, and the valve is constructed with ports *n'* and *o'*, to alternately connect such pipes or passages with the pipe *m*. A tilt-lever *G*, consisting in an iron tube closed at the ends, with a charge of mercury inside, is supported upon a rock-shaft *r* and connected by a link *q* with a crank *p* to operate the valve *m'*.

The hydrocarbon vapor formed in the generator passes from the top of the generator through a check-valve *V*, and thence into pipe *h*, communicating with the nozzle *R* of the inspirator. The body of the inspirator is formed of hour-glass shape, with chamber *T* above and chamber *W* below the waist, the latter connecting with a pipe *P* and check-valve *F*, which delivers the mixed air and vapor to the receiver *E*. The chamber *T* com-

municates, through a passage U in the head-piece, with a casting B, having a flexible flap-valve fitted therein over a hole, to which the air has free access. The receiver is formed of a dish-shaped or concave casting having a flexible diaphragm *v* attached to its periphery and clamped about its middle by circular collars *u*. The collars are provided with arms and with hubs, to which latter is attached a guide-rod *x*, the inner end of which slides in an axial socket N, while the outer end is pivoted to a bent lever *t*, for actuating the tilt-lever G. A weight J is affixed to the free end of the bent lever *t*, and a gas-pipe H is attached to the pipe P outside of the receiver to deliver the mixed air and vapor for consumption. The bent lever actuates the tilt-lever by an arm *s*, fixed upon the rock-shaft and connected with the lever *t* by a slotted link *s'*, such construction permitting the tilt-lever to move suddenly after it has been carried to the horizontal position by the lever *t*, as is common with such mechanism.

The valve-box L contains two check-valves *a* and *b*, between which is connected the bore *d* of the pump-barrel *c*, and a plunger I, fitted to the pump, furnishes the means of drawing the hydrocarbon fluid through pipe P' and discharging it through pipe *f* into the lower part of the generator. In operating the machine such pump, if used, would be operated by hand, or the receiver charged with an initial supply of hydrocarbon fluid in any convenient manner.

The operation of the apparatus thus charged is as follows: The pipes *n* and *o* are connected with suitable supplies of hot and cold fluid—as steam, water, or air—and the valve *m'* is turned to admit the heated fluid to the jacket *i*. Such heated fluid, when introduced by the pipe *m*, flows first into a conical distributor *k*, which is shown in Figs. 4 and 5, formed of thin metal and clamped by a flange at its larger end between the jacket *i* and the stuffing-box N. The heating-fluid is discharged from the distributor through notches *l* adjacent to the shell of the generator G, such notches being formed all around the distributor to throw the heating or cooling fluid into contact with all parts of the shell. The heat applied to the generator vaporizes the liquid which passes through the check-valve V into the nozzle of the inspirator, the opening of which is regulated by a valve-rod Q. With the valve properly adjusted, the vapor operates to draw a current of air through the inlet-aperture Y, and the delivered air and vapor then pass through the check-valve F to the receiver E and delivery-pipe *h*. The pressure of the vapor operates to expand the diaphragm *v* of the receiver and to lift the weight J by moving the bent lever *t*, thus holding the valve *m'* in the desired position to supply the hot fluid to the jacket *i* so long as the generation of vapor exceeds the consumption or draft upon the delivery-pipe *h*. When the pressure of the vapor falls below the desired

limit, the diaphragm *v* is pressed inward by the operation of the weight J, and the link *s'* then operates gradually to shift the tilt-lever G and valve *m'* until the tilt-lever passes a horizontal position, when the mercury within its tube immediately shifts to the opposite end of the tilt-lever and turns the valve *m'* into a suitable position to admit cold fluid to the jacket of the generator. Such cold fluid rapidly condenses the vapor in the generator, producing a sufficient vacuum therein to draw the hydrocarbon liquid from its reservoir, the current of cold fluid passing into the pipe *m* and from the pipe *y* until the discharge of vapor from the receiver, under the pressure of the weight J, shifts the bent lever to reverse the position of the tilt-lever and admit the hot fluid through the valve *m'*. The hot fluid would then flow again into the jacket and operate to vaporize the liquid therein as before, such vaporization continuing until the pressure in the receiver again lifted the weight J and shifted the tilt-lever to admit the cooling-fluid to the jacket. If the draft upon the machine were about equal to its normal capacity, the supply of hydrocarbon liquid would thus be intermittently drawn into the generator and vaporized at the desired rate; but if the demand upon the machine should cease the generation of vapor would continue until the increase of pressure in the receiver operated to raise the weight J and turn the valve *m'* to introduce the cooling-fluid to the jacket *i*. With the construction shown the cooling-fluid would then circulate continuously through the jacket, as described above; but the volume of such fluid that is required to operate the machine is exceedingly small and its waste under such conditions would be of very little value. When the use of the machine actually ceases, the operator would shut off the supply of the hot and cold fluid from the valve *m'* in any convenient manner, and the generator would then contain a charge of hydrocarbon liquid adapted for starting the machine upon a subsequent occasion without using the pump I. The valve *a* in the valve-box L operates in all cases to retain the hydrocarbon liquid in the generator when the pressure is produced therein by the application of heat to the surrounding jacket, while such valve freely opens when the vacuum is formed in the generator to admit the hydrocarbon liquid from the pipe P' to the generator.

It is common to use an expansion gas-receiver in connection with machines for vaporizing hydrocarbon liquid, and to actuate a valve in such a machine by suitable connection with some moving part of the expansion receiver. It is also common to use an inspirator for mingling air with the hydrocarbon vapor, and I do not therefore claim the mere union of an inspirator and gas-receiver with a generator.

My invention differs from others of its class in having the generator provided with a con-

5 tiguous jacket or receptacle adapted to retain hot or cold fluid in contact with the generator connected by suitable valves with supplies of hot and cold fluid, and such valves actuated continuously by a movable part of the gas-receiver.

10 The function of the jacket in my invention is to retain the hot or cold fluid in contact with the generator, so as to vaporize or chill its contents in the desired manner, and such function may be performed by many other constructions. Thus a coil of steam-pipe is often inserted in a tank of water to heat the surrounding fluid, and a coil of cold-water
15 pipe is inserted in a vessel to chill the exhaust-steam discharged into such vessel from an engine-cylinder. In such cases the coil serves as the receptacle to retain the hot or cold fluid, and its contents operate upon the contents of the contiguous vessel the same as a steam-jacket or cold-water jacket would do if applied to the periphery of the same.

20 The jacket shown in the drawings does not extend from one end to the other of the generator; but it is obviously immaterial how the jacket be constructed, provided it retains the hot or cold fluid in contact with the generator, so as to vaporize or chill its contents in the desired manner, and it is therefore imma-
30 terial whether the receptacle for the hot or cold fluid be applied to the ends of the generator instead of its periphery, or whether it be formed as a coil and inserted within the generator, as its function would be the same whatever its construction. I have, however,
35 claimed my own particular construction of the receptacle for hot and cold fluid, as it is particularly adapted, by the use of the stuffing-boxes and springs S' , to compensate for the expansion and contraction which result from
40 its constant changes in temperature.

It is obviously immaterial what form of gas-receiver be used, provided it has a movable part connected with the valve m' or its equivalent, and it would also be immaterial whether
45 such receiver performed any function besides the shifting of the valves for introducing the hot and cold fluid to the generator-jacket, except that it is desirable to make the gas-receiver a reservoir to supply the vapor for consumption while the valves are being shifted to change the current of fluid into the jacket.
50 With the form of gas-receiver shown the diaphragm v would be pressed only partly inward when the valve m' was shifted, and would continue, under the influence of the weight J , to move into the concave casting E and to supply the vapor for consumption, while the temperature of the generator is
55 changed and the hydrocarbon liquid drawn into it and again heated to renew the vaporization.

60 In Fig. 3 the jacket supply-valve m' is shown with passages n' and o' at its opposite ends connecting with the pipes n and o , and such passages would be so arranged in the plug of the valve as to alternately open one of such

pipes and connect it with the pipe m ; but such passages operate in any case the same as separate valves applied to the pipes n and o
70 and operated by the link q or any other suitable means connected with the movable part of the gas-receiver. I have therefore regarded the two passages as separate valves, and so claimed them herein.

75 If desired, the jacket may be formed about the generator by other means than that shown herein; but I prefer the construction shown, with the stuffing-boxes at opposite ends, as it affords a convenient means for introducing
80 the distributor k and for compensating for the variations in the expansion of the generator and the jacket.

I am fully aware that a water-jacket has been placed around a generator and a flame
85 applied to such jacket to heat the water, the object of the water-jacket being merely to limit the temperature of the generator. I do not therefore claim as new the application of a water-jacket to a generator.

90 From my above description the function of my jacket is not at all to prevent the overheating of the generator, but to furnish a means of retaining hot and cold fluid alternately in contact with the generator, so that
95 the latter may operate alternately as a vaporizer and a condenser, and may thus intermittently produce a vacuum to draw the hydrocarbon fluid intermittently from the reservoir.

100 By the alternate heating and cooling of the reservoir I make the apparatus self-feeding and render its operation continuous with more certainty than by the use of any mechanical device external to the generator to
105 feed the fluid intermittently into the latter.

Having thus set forth my invention, what I claim is—

1. In a hydrocarbon-vaporizing apparatus, the combination, with the generator, of a con-
110 tiguous receptacle for retaining hot and cold fluid in contact with the generator, pipes for supplying hot and cold fluid to the said receptacle, valves with passages for alternately connecting such pipes with the receptacle, and
115 a gas-receiver with a movable part arranged and operated to shift such valves, as and for the purpose set forth.

2. In a hydrocarbon-vaporizing apparatus, the combination, with the generator, of a con-
120 tiguous receptacle for retaining hot and cold fluid in contact with the generator, pipes for supplying hot and cold fluid to the said receptacle, a gas-receiver with a movable part arranged and operated to shift such valves,
125 and an open discharge-pipe from the receptacle, as and for the purpose set forth.

3. In a hydrocarbon-vaporizing apparatus, the combination, with a cylindrical generator, of a receptacle for hot and cold fluid sur-
130 rounding the same, a distributor inserted in the receptacle with notches adjacent to the shell of the generator, a discharge-pipe from such receptacle, and pipes for supplying hot

and cold fluid to such receptacle, as and for the purpose set forth.

4. In a hydrocarbon-vaporizing apparatus, the combination, with a cylindrical generator *g*, of the cylindrical receptacle *i* surrounding a portion of the same, stuffing-boxes applied to the ends of the generator and clamped upon the ends of the receptacle, and pipes for supplying hot and cold fluid to the receptacle, as and for the purpose set forth.

5. In a hydrocarbon-vaporizing apparatus, the combination, with a cylindrical generator *g*, of the cylindrical receptacle *i*, surrounding a portion of the same, stuffing-boxes *M*, applied to the generator, with flanges *j*, grooved to fit the ends of the receptacle *i*, glands *M'*, fitted to the stuffing-boxes, rods *R'*, with nuts applied to the flanges of the glands, and springs *S'*, applied to the rods to press the flanges *j* elastically together upon the receptacle *i*, and pipes to supply hot and cold fluid to the receptacle, as and for the purpose set forth.

6. In a hydrocarbon-vaporizing apparatus, the combination, with the generator, of a contiguous receptacle for retaining hot and cold fluid in contact with the generator, pipes for supplying hot and cold fluid to the said receptacle, valves with passages for alternately connecting such pipes with the receptacle, a gas-receiver with a movable part arranged and operated to shift such valves, a generator supply-pipe connected with the reservoir of hydrocarbon fluid, a valve-chamber inserted in such supply-pipe, and a pump connected with such valve-chamber to force the hydrocarbon fluid into the generator when starting the apparatus, as and for the purpose set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two witnesses.

HERBERT COTTRELL.

Witnesses:

W. H. TUCKER,
H. C. CONdit.