

No. 635,071.

Patented Oct. 17, 1899.

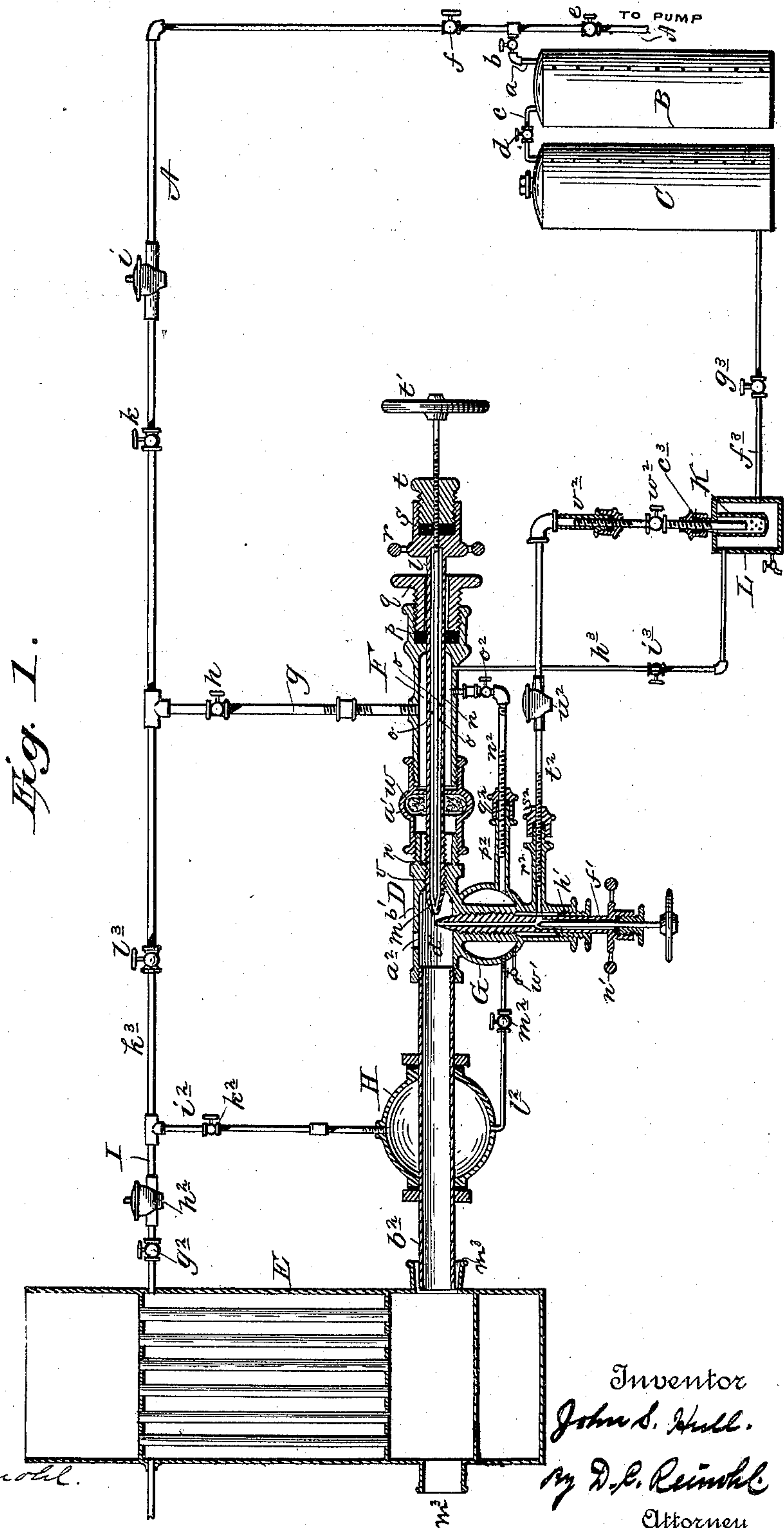
J. S. HULL.

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(Application filed Jan. 10, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses  
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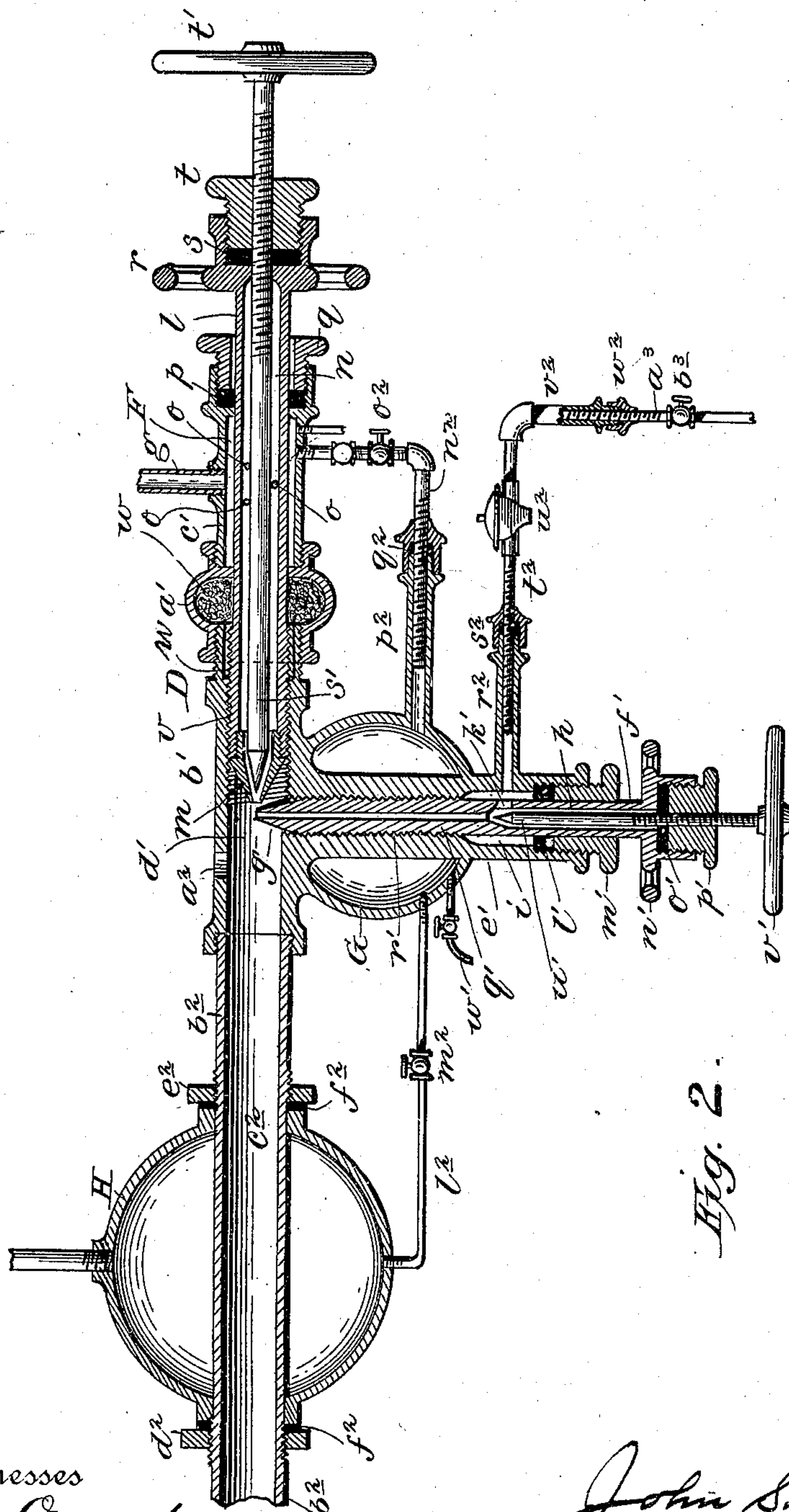
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# UNITED STATES PATENT OFFICE.

JOHN S. HULL, OF BALTIMORE, MARYLAND.

## APPARATUS FOR BURNING HYDROCARBON OIL.

SPECIFICATION forming part of Letters Patent No. 635,071, dated October 17, 1899.

Application filed January 10, 1899. Serial No. 701,753. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN S. HULL, a citizen of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Apparatus for Burning Hydrocarbon Oil; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the art of burning hydrocarbon oil, has for its object the promotion of perfect combustion, and consists in certain improvements in construction, which will be fully disclosed in the following specification and claims.

In the accompanying drawings, which form part of this specification, Figure 1 represents my invention partly in section and partly in side elevation; and Fig. 2, a vertical longitudinal section of the burner detached and on an enlarged scale.

Reference being had to the drawings and the letters thereon, A indicates an air-supply pipe leading from a pump (not shown) to the air-reservoir B through branch pipe *a* and valve *b*; C, an oil-reservoir, which may be supplied with crude petroleum or other hydrocarbon oil; D, the burner, and E a boiler, which may be of any preferred construction, such as stationary, marine, or portable or locomotive boiler.

The air-reservoir B is connected to the oil-reservoir C by means of a pipe *c* and valve *d* to supply oil to the burner under pneumatic pressure, and the main air-supply pipe A is provided with valves *e f* for directing the air from the pump to the reservoir B or to the air or steam chamber F of the burner through branch pipe *g*, which is provided with a valve *h* for controlling the supply of air or steam to the burner, and the pipe A is provided with a pressure-regulator *i* for regulating the degree of pressure of the air and with a valve *k* for controlling the quantity of air supplied to the burner.

The burner is provided with a longitudinally-adjustable tube *l*, having a conical discharge end *m*, and within said tube is a fluid-chamber *n*, which communicates with the chamber F through orifices *o* in the tube. The tube extends through packing-chamber

*p*, which is provided with an adjustable gland *q*, and at its outer end is an operating-wheel *r* on the inner end of a supplemental stuffing-box *s*, having a gland *t*, and the inner end of the tube *l* is screw-threaded externally at *u* and engages an internal screw-thread *v* in the burner. To prevent leakage from the chamber F to the end of the tube *l*, a packing-chamber *w* is provided in the section *a'* of the burner, the several sections *a'*, *b'*, and *c'* being connected by screw-threads, as shown. The section *b'* contains the ignition or primary combustion-chamber *d'* and into which the tube *l* extends. This section has a branch *e'* extending therefrom and contains a longitudinally-adjustable tube *f'*, having a conical discharge end *g'*, and within said tube is a liquid-chamber *h'*, which communicates with the chamber *i* through orifice *k'* in the tube. The tube extends through packing-chamber *l'*, which is provided with an adjustable gland *m'*, and at its outer end is an operating-wheel *n'* on the inner end of a supplemental stuffing-box *o'*, having a gland *p'*, and the inner end of the tube is screw-threaded externally at *q'* and engages an internal screw-thread *r'* in the branch *e'*.

The supply of fluid discharged from tube *l* is controlled by a needle-valve *s'*, operated by wheel *t'*, and the supply of liquid discharged from tube *f'* is controlled by a needle-valve *u'*, operated by wheel *v'*.

Surrounding the branch *e'* is a heating-chamber G for heating the hydrocarbon oil, and thereby rendering it thin and causing it to flow with celerity. The chamber is provided with a drain-pipe *w'* for relieving the chamber of any condensation which may accumulate therein.

The section *b'* is provided with a port or opening *a<sup>2</sup>*, through which air is supplied to promote combustion and ignition of the burner affected, and to the outer end of said section is attached the retort or burner tube *b<sup>2</sup>*, in which a secondary combustion-chamber *c<sup>2</sup>* is formed, and surrounding said tube is a fluid-heating chamber H, secured thereon by any preferred means, such as nuts *d<sup>2</sup> e<sup>2</sup>*, with packing *f<sup>2</sup> f<sup>2</sup>* interposed between the ends of the chamber and the nuts.

I is a pipe communicating with the steam-space of the boiler, is provided with a valve



$g^2$ , a pressure-regulator  $h^2$ , and a branch  $i^2$ , having a valve  $k^2$ , and is connected to the wall of the chamber H for supplying steam thereto, which is superheated by the intense heat in the retort or burner tube  $b^2$  and is conducted from said chamber through pipe  $l^2$  and valve  $m^2$  into the chamber G and flows from the latter chamber through pipe  $n^2$  and valve  $o^2$  into chamber F in section  $c'$  of the burner. The pipe  $n^2$  is adjustable in the lateral branch  $p^2$ , and the branch is provided with a packing-box  $q^2$ . The lateral branch  $r^2$  is provided with a packing-box  $s^2$ , and from said branch extends a pipe  $t^2$ , also adjustable in the branch and provided with a regulator  $u^2$ , and from the pipe  $t^2$  a pipe  $v^2$ , having a stuffing-box  $w^2$ , extends downward and is connected to an adjustable section  $a^3$ , having a valve  $b^3$ , which connects with an oil-filter K, which is provided with a packing-chamber  $c^3$ . The filter is connected to the oil-reservoir C by a pipe  $f^3$ , having a valve  $g^3$ , and to the fluid-chamber F by a pipe  $h^3$ , having a valve  $i^3$ . The latter pipe provides means for heating the oil in the tank L, surrounding the filter K. The branches  $g$  and  $i^2$  are connected by a section  $k^3$ , having a valve  $l^3$ .

By the construction shown air under pressure may be supplied to the burner through chamber F in a cold state direct from the pump or from the reservoir B through pipe A and branch  $g$  or air may be conducted through pipe A and branch  $i^2$  to the chamber H and heated and conducted from chamber H through chamber G and after heating the oil in its passage through pipe  $n^2$  to chamber F, or steam may be conducted direct from the boiler through pipe I, section  $k^3$ , and branch  $g$  directly into chamber F or steam may be conducted from the boiler through pipe I and branch  $i^2$  into chamber H and there superheated and conducted from thence through chamber G into chamber F.

The fire-chamber or furnace of the boiler is provided with any desired number of ports  $m^3$  to receive the retort-tube  $b^2$  of burners.

Having thus fully described my invention, what I claim is—

1. In a hydrocarbon-burner, the combination of a retort or burner tube, suitably-valved liquid and fluid conduits communicating separately with said tube, a heating-chamber surrounding the liquid-conduit, means for supplying air or steam to said heating-chamber, said means being adapted to be heated by the retort or burner tube, substantially as described.

2. In a hydrocarbon-burner, the combination of a retort or burner tube, communicat-

ing concentric fluid-chambers and communicating concentric liquid-chambers, provided with valves and communicating separately with said tube, a heating-chamber surrounding the liquid-chamber, means for supplying air or steam to said heating-chamber, said means being adapted to be heated by the retort or burner tube, substantially as described.

3. In a hydrocarbon-burner, the combination of a retort or burner tube, suitably-valved liquid and fluid conduits communicating separately with said tube, a fluid-heating chamber surrounding said tube, and a chamber for heating the liquid communicating with said fluid-heating chamber, substantially as described.

4. In a hydrocarbon-burner, the combination of a retort or burner tube, a fluid and a liquid conduit provided with suitable valves and communicating with said tube, a heating-chamber surrounding the retort or burner tube, means for conducting air or steam to said heating-chamber, and a chamber for heating the liquid, communicating with the heating-chamber and with the fluid-conduit.

5. A hydrocarbon-burner having a retort or burner tube, a fluid and a liquid conduit provided with suitable valves and communicating separately with said tube, and means for supplying steam to heat the liquid supplied to the burner, and means for supplying heated fluid to the burner, in combination with means for superheating said steam, substantially as described.

6. A hydrocarbon-burner having a fluid-supply and a liquid-supply arranged at an angle to each other, a retort or burner tube, and a heating-chamber surrounding said tube, in combination with means for heating the liquid and means for supplying heated fluid to the burner, both of which means communicate with the chamber around the retort or burner tube.

7. In a hydrocarbon-burner, the combination of a retort or burner tube, a fluid and a liquid conduit provided with suitable valves and communicating with said tube, a heating-chamber surrounding the retort or burner tube, means for conducting air or steam to said heating-chamber, a chamber for heating the liquid, communicating with the heating-chamber and adjustably connected with the fluid-conduit, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN S. HULL.

Witnesses:

GEO. E. TAYLOR,  
 EDW. S. ADAMS.