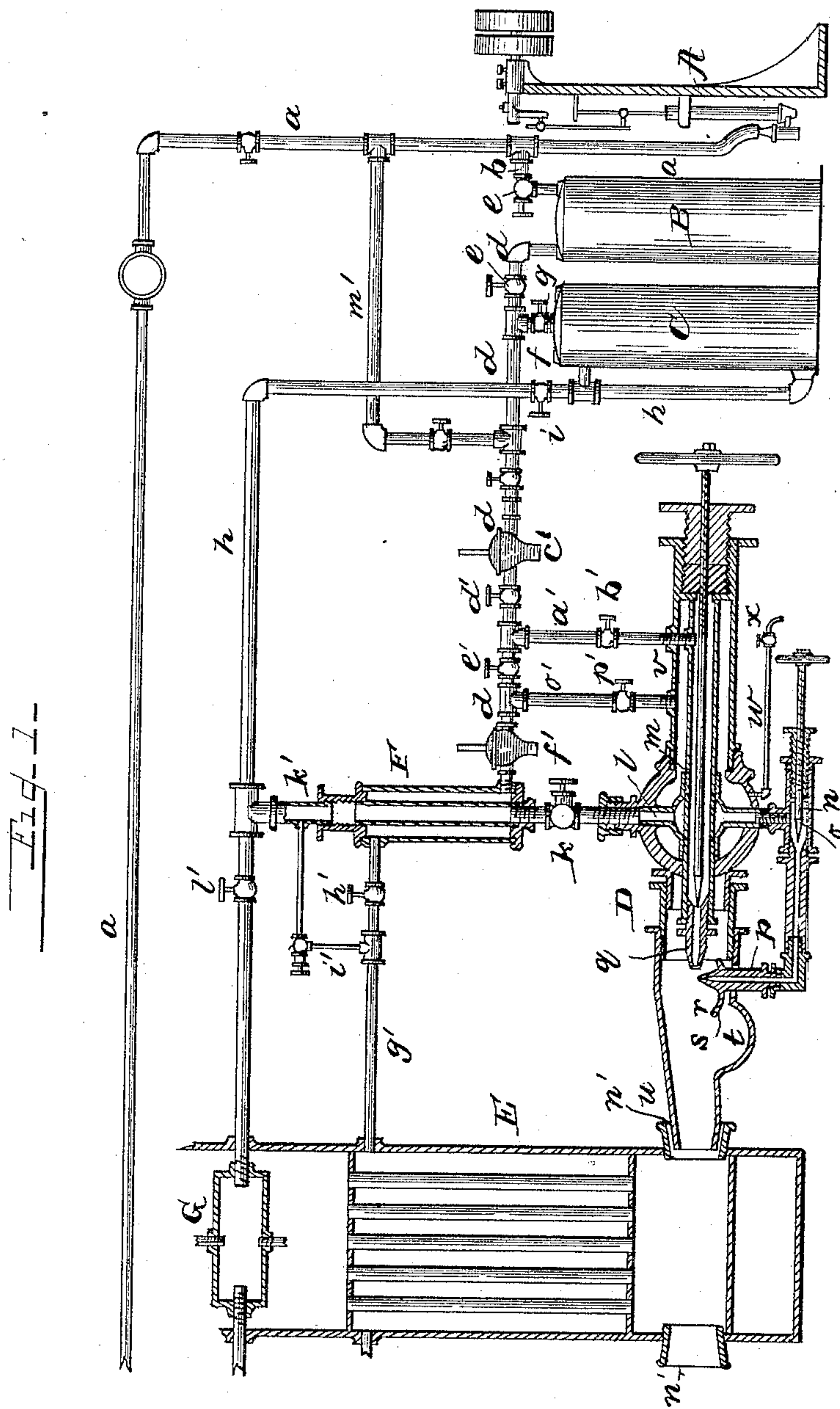


(No Model.)

2 Sheets—Sheet 1.

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APPARATUS FOR BURNING HYDROCARBON OIL.  
No. 436,918.  
Patented Sept. 23, 1890.



Witnesses

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L. B. Whitaker.

Inventor  
John S. Hull  
By his Attorneys  
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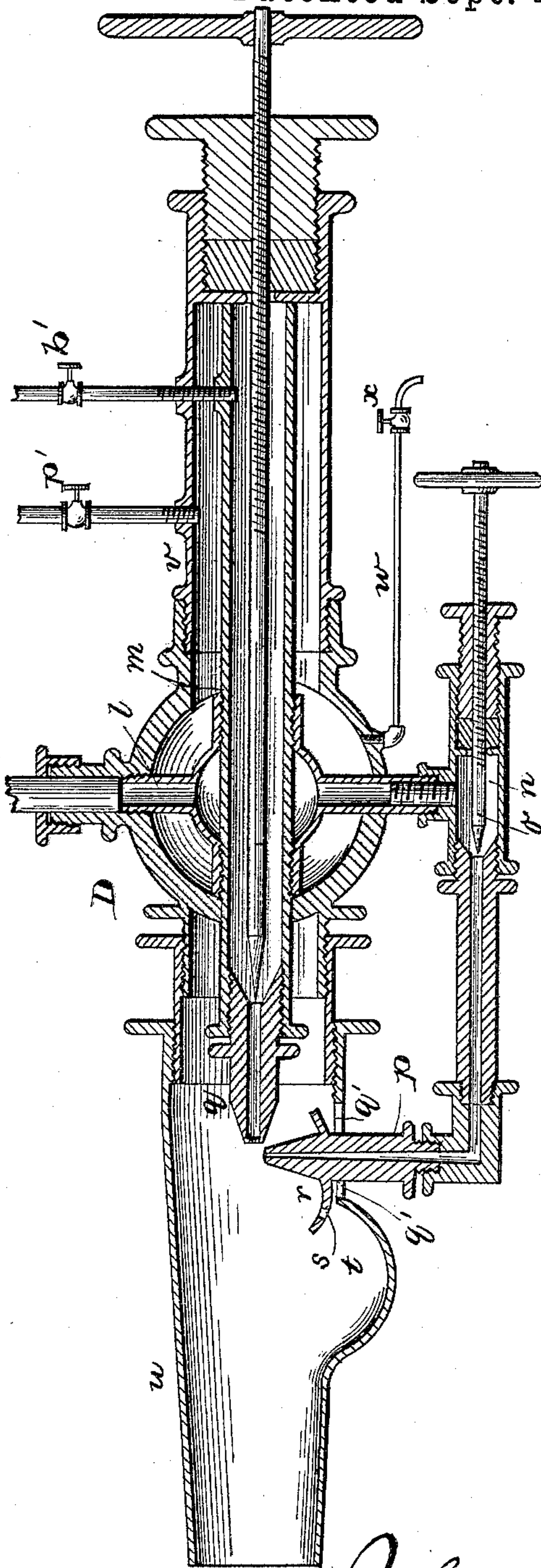
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# UNITED STATES PATENT OFFICE.

JOHN S. HULL, OF BALTIMORE, MARYLAND.

## APPARATUS FOR BURNING HYDROCARBON OIL.

SPECIFICATION forming part of Letters Patent No. 436,918, dated September 23, 1890.

Application filed May 24, 1890. Serial No. 353,060. (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, and has for its object certain improvements in the construction of apparatus therefor, which will be hereinafter described, and particularly pointed out in the claims.

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

Reference being had to the drawings and the letters thereon, A indicates an air-pump; B, an air-reservoir; C, an oil-reservoir; D, the burner, and E the boiler.

To the pump A is attached a pipe *a*, which communicates with the reservoir B through a branch pipe *b* and valve *c*, and the reservoir B communicates with the reservoir C through pipe *d*, valve *e*, branch *f*, and valve *g* for displacing the oil in the reservoir and supplying the burner D through pipe *h*, valve *i*, heater F, valve *k*, and conduit *l*. The oil may also be supplied to the burner from the heater G in the upper part of the boiler E, and in either case it flows down the conduit *l* around the tube *m*, down into chamber *n*, provided with a needle-valve *o*, and on through nipple *p*, where it is atomized by the blast or current of air or steam from the nipple *q*. The nipple *p* is provided with a drip-cup *r* to arrest any oil which may not be atomized and prevent its dripping out upon the floor, and from the drip-cup the oil flows through a perforation *s* into a depression or pocket *t* in the retort-tube *u*, where it is converted into vapor by the heat of said tube.

The tube *m* is surrounded by a tube *v*, which forms a chamber between the two for the reception of steam to heat the air used to vaporize or atomize the air to start the burner, and the water of condensation is drawn from

the chamber around the tube *m* by a pipe *w* and valve *x*.

From the pipe *d* extends a branch *a'*, having a valve *b'* for supplying air to the tube *m*, and is controlled by a pressure-regulator *c'* and valve *d'*. These are used only to start the apparatus. When the burner has become thoroughly heated, the valve *d'* is closed and the valve *e'* opened, when steam from the heater F will flow through the regulator *f'* into the branch *a'* and the chamber in the tube *m* and atomize the oil. The heater F communicates with the steam-space of the boiler E through pipe *g'* and valve *h'*, and from the pipe *g'* a branch *i'* extends to the branch *k'*, through which the oil is supplied from pipe *h* to the heaters F or G. The branch *i'* and its valve are used for admitting steam to the oil-supply conduit for removing any heavy matter which may clog the same. The heater G may supply any desired number of burners by proper connection therewith and provided with suitable valves, as *l'*. Steam from the heater F is supplied to the chamber between the tubes *m* and *v* through regulator *f'*, pipe *o*, and valve *p'* for heating the air used to start the burner.

From the pipe *a* there extends a pipe *m'* and communicates with the pipe *d* for augmenting the supply of air when desired, and the pipe *a* extends along, across, or around the boiler to supply any additional burners employed to start them.

The fire-chamber of the boiler is provided with any desired number of ports *n'* to receive the retort-tubes *u*. The retort-tube is provided with an opening *q'*, which surrounds the nipple *p* and admits air to promote the combustion of the oil, and the end of the nipple *q* is provided with a number of small perforations in its end to deliver the air or steam in a number of streams to effectually atomize the oil flowing from the nipple *p*. The nipples *p* and *q* are proportioned in size, and the supply of oil and air or steam is regulated by the needle-valves, so that about sixteen parts of air or steam are supplied to one part of oil.

The apparatus is designed for burning coal-oil, and may be applied for various purposes.

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



1. In apparatus for burning hydrocarbon oil, a burner provided with an air-chamber terminating in a nozzle and having a needle-valve, a steam-chamber surrounding the air-chamber, and an oil-supply passing transversely through the steam-chamber, and surrounding a portion of the air-chamber and discharging into a separate chamber terminating in a nozzle and provided with a needle-valve, the several parts being combined substantially as described.

2. In apparatus for burning hydrocarbon oil, a burner provided with an air-chamber terminating in a nozzle, a steam-chamber surrounding the air-chamber, an oil-heater, a supply-conduit passing transversely through the steam-chamber, a steam-supply pipe communicating with the oil-heating chamber, and a separate oil-chamber terminating in a nozzle and provided with a needle-valve, substantially as described.

3. In apparatus for burning hydrocarbon oil, an air-discharging nozzle and an oil-discharging nozzle having a drip-cup, in combination with a retort-tube provided with a depression, substantially as and for the purpose set forth.

4. In apparatus for burning hydrocarbon oil, an oil-reservoir, and means for applying

pressure thereto, in combination with a burner provided with an air-chamber terminating in a nozzle and having a needle-valve, a steam-chamber surrounding the air-chamber, and an oil-supply passing through the steam-chamber and surrounding a portion of the air-chamber and discharging into a separate chamber terminating in a nozzle and provided with a needle-valve, substantially as described.

5. In apparatus for burning hydrocarbon oil, an oil-reservoir, and means for supplying pressure thereto, in combination with a burner provided with a chamber terminating in a nozzle and having a pipe attached thereto communicating with an air and a steam supply pipe, a steam-chamber surrounding the former chamber, and an oil-supply conduit passing transversely through the steam-chamber and surrounding a portion of the air and steam chamber and discharging into a separate chamber terminating in a nozzle and provided with a needle-valve, substantially as described.

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

JOHN S. HULL.

Witnesses:

D. C. REINOHL,  
WM. E. DYRE.