(No Model.) 2 Sheets—Sheet 1.

# F. A. LYMAN.

## VAPOR BURNER.

No. 381,843. Patented Apr. 24, 1888.

Fig. 1.

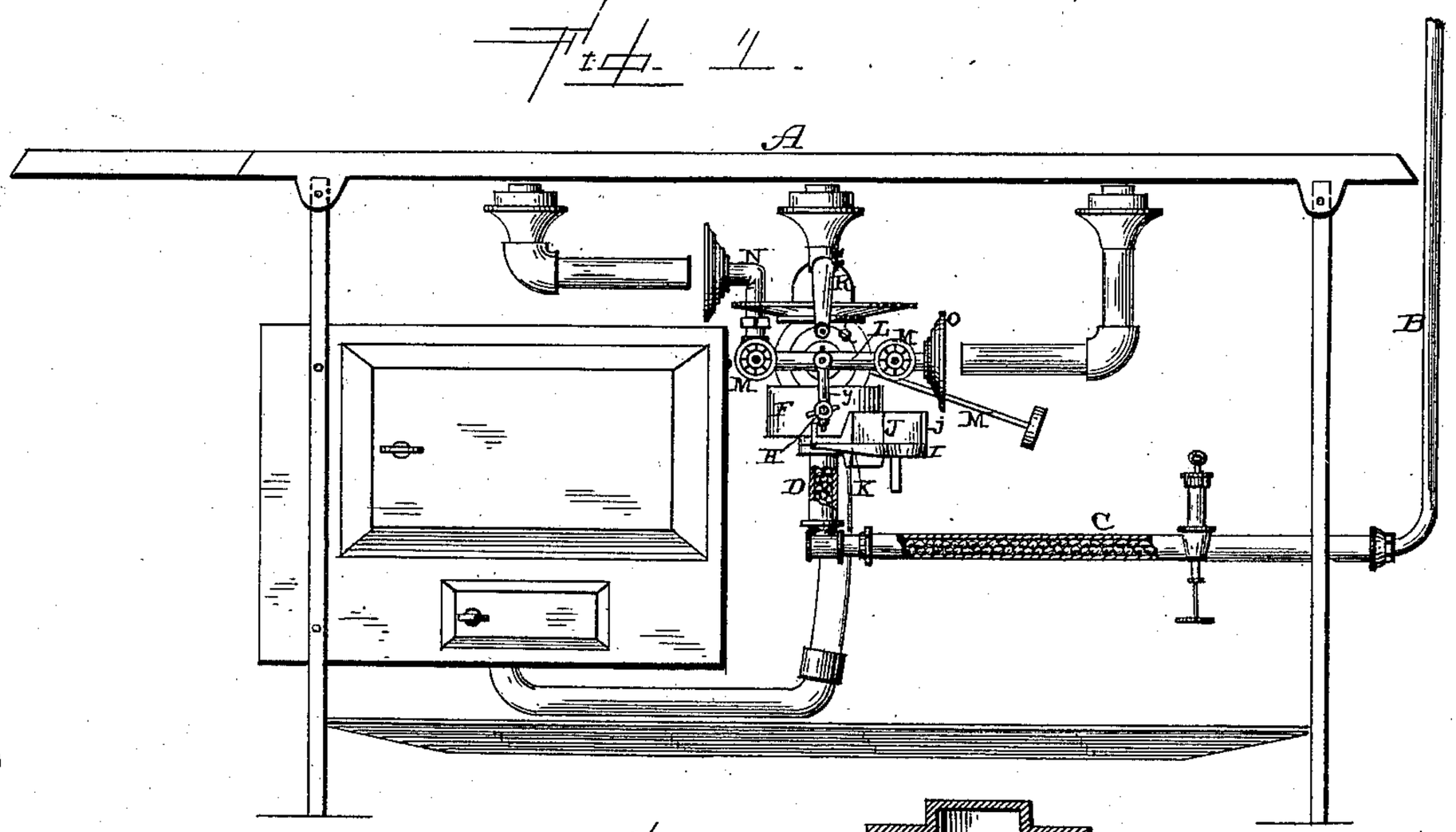



Fig. 2.

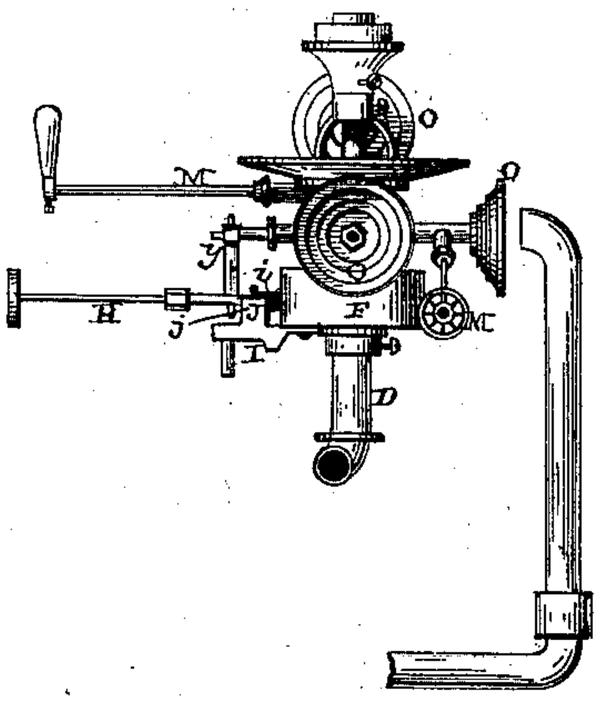
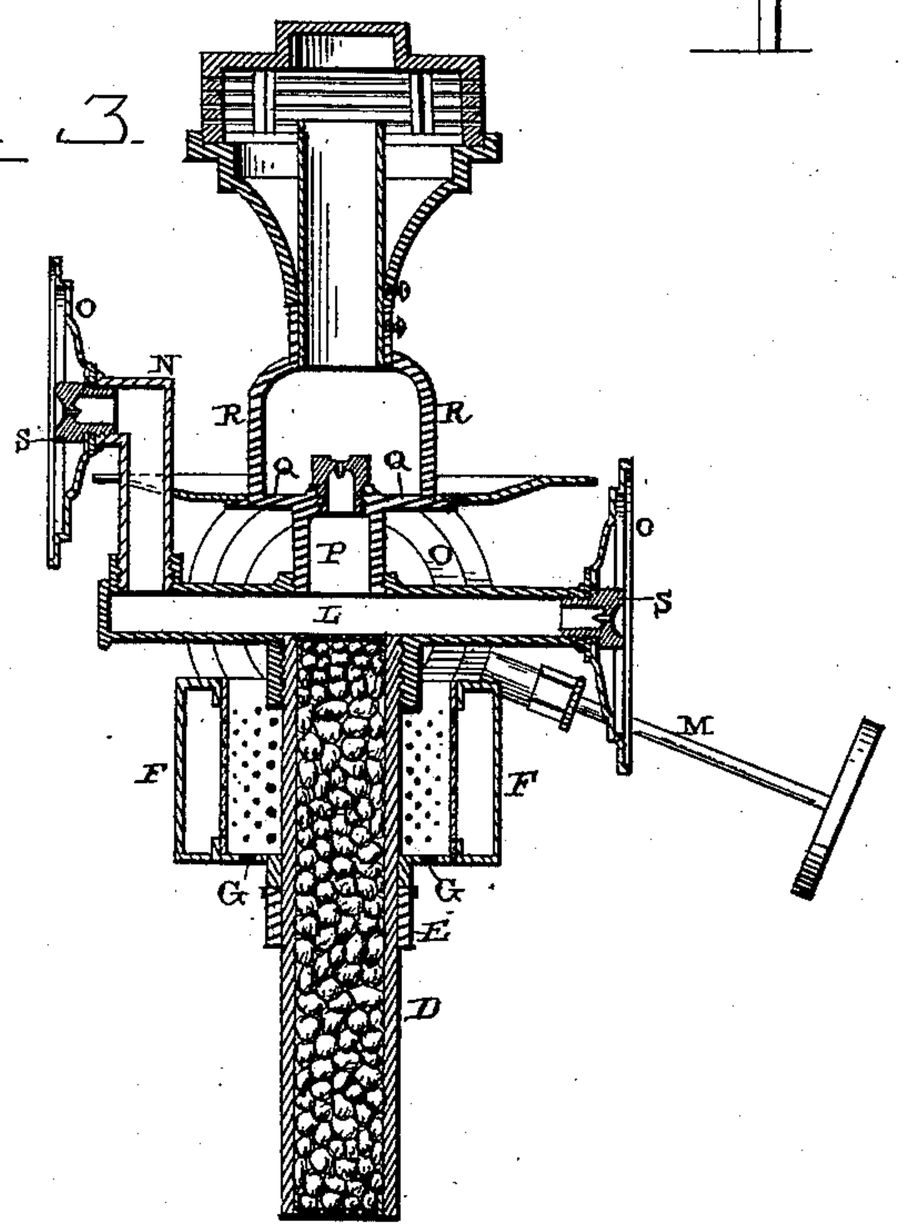



Fig. 3.




Witnesses.
L. F. Gardner.
Edw. P. Ellis.

Inventor.
F. A. Lyman.
per F. A. Lehmann,
Atty

(No Model.) 2 Sheets—Sheet 2.

# F. A. LYMAN.

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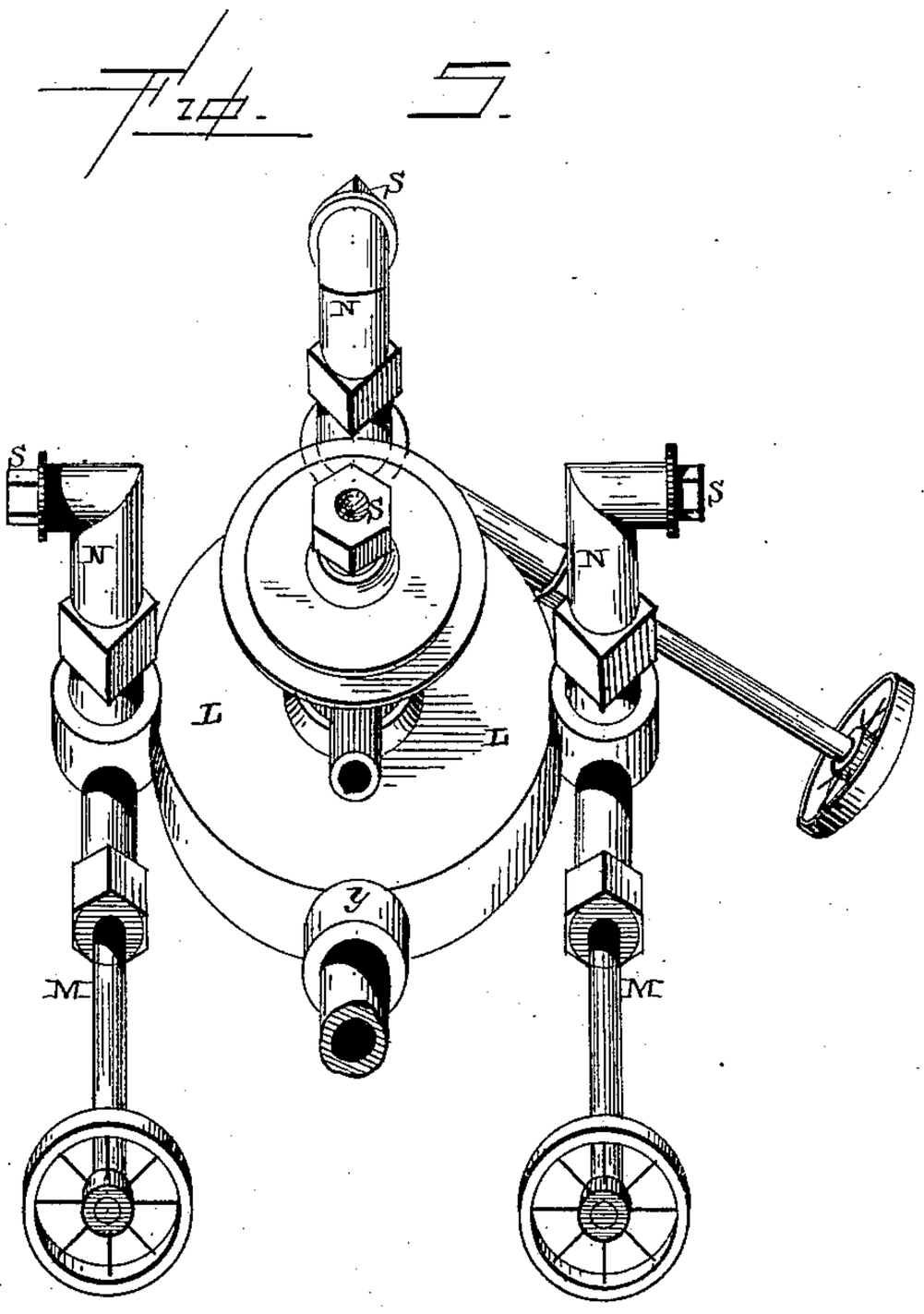


Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Witnesses.
C. F. Gardner
Edm. P. Ellis

Inventor.
F. A. Lyman,
per F. A. Lehmann,
Atty.

# UNITED STATES PATENT OFFICE.

FORDYCE ALLEN LYMAN, OF CLEVELAND, OHIO.

## VAPOR-BURNER.

SPECIFICATION forming part of Letters Patent No. 381,843, dated April 24, 1888.

Application filed March 2, 1887. Serial No. 229,405. (No model.)

*To all whom it may concern:*

Be it known that I, FORDYCE ALLEN LYMAN, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Vapor-Burners; 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in vapor-burners; and it consists in a burner having an enlarged supply-pipe filled with packing material, a rotating heating-chamber and lighting-cup, and movable delivery-pipes for supplying vapor to supplemental burners, all as hereinafter fully described and claimed.

The object of my invention is to place upon the stand-pipe a heating-chamber which has the lighting-cup secured thereto, and which chamber can be turned through a portion of a circle carrying the lighting-cup with it; to provide the lighting-cup with stops to limit the distance the lighting-chamber shall be turned upon the stand-pipe, and to provide the lighting-cup with two wells, which are connected together by means of a perforation through the partition which separates them.

Figure 1 is a side elevation of a vapor-burner stove embodying my invention, the stand and supply pipes being in section. Fig. 2 is a side elevation of the central generating-burner and its attachments, taken at right angles to Fig. 1. Fig. 3 is a vertical section taken down through the burner. Fig. 4 is a detached view of the heating-chamber and lighting-cup alone. Fig. 5 shows a generating-chamber from which the pipes rise vertically. Figs. 6 and 7 are details of the lighting-cup.

A represents the frame-work of the stove; B, the vertical supply-pipe leading from the tank; C, the horizontal supply-pipe, and D the vertical stand-pipe for the central generating-burner. The supply and stand pipes C D are made much larger than is usual in the construction of vapor-burner stoves, and both of these pipes are filled with a suitable packing material of any kind, but preferably of small gravel.

In vapor-burner stoves where the gas is generated by a single generator of sufficient capacity to supply several burners with gas, when such a generator is not supplying the other burners, but at the same time is kept heated by the generating-flame ready for use, there must necessarily be an accumulation of gas, and a pressing or forcing back of the liquid fuel into the tank, and the heat follows back through the stand and supply pipes. The trouble heretofore has been to prevent the burners from puffing when the gas for one or more burners would be turned on. Where small stand and supply pipes have been used, the vapor extends back into the small spaces afforded by these pipes and is pressed forward by the liquid fuel, which, coming in contact with the heated portion of the generator, causes a sudden expansion of gas, and this expansion causes the puffing of the burners. To prevent this trouble, I enlarge the supply-pipe in proportion to the size or capacity of the generator to be used and fill it with a continuous packing of suitable material—such as small pebbles—from the stand-pipe or generator to any desired distance outward, so that when the generator is at its greatest heat the gas will not extend beyond the packing. When the burners are lighted, the supply-pipe being large, the movement of the fuel is slow in comparison to what it is in a smaller supply-pipe, the temperature will be kept uniform, and the liquid will move on into the generator without encountering sudden changes of temperature. The enlarged supply-pipe absorbs the heat from the generator when the gas is not being used, and thus forms a storage place for the accumulated gas. This enlarged supply or retort pipe may be placed in a horizontal or vertical position and still be within the meaning of my invention.

Placed upon the stand-pipe for the central generator is the rotating heating-chamber F, which is provided with a tube, *i*, in one side for the admission of the vapor which is to be used in heating the generator, and which is provided with small openings G through its bottom for the admission of air to support combustion at the top of the generator for heating the generating-chamber. This chamber F is supported loosely upon the stand-pipe by means of a collar, E, secured thereto, so that

it can be rotated partially around and thus move the tube *i* out of line with the casing of the valve H, when the lighting-cup I is to be brought into use. The delivery-pipe *y* projects out from one side of the chamber L and extends outward and downward and has the valve H passed through its lower end for the purpose of controlling the supply of vapor through the induction-tube *i*. This lighting-cup I is secured to the rotating heating-chamber F, and when the chamber is moved this cup swings around through an arc of a circle, as shown by dotted lines. This cup I is divided by the vertical central partition J into two wells, *a c*, the outer one of which, when the cup is brought into use, comes directly under the valve H, while the inner well comes under the heating-chamber, so as to ignite the vapor which escapes at the top of the chamber. These two wells are connected together by a small opening, *g*, in the bottom of the vertical partition, so that the flame can pass from the outer to the inner well when the fluid in the cup has been nearly consumed. The lighting-cup and the heating-chamber are moved into the position indicated by dotted lines in Fig. 4, and the valve controlling the escape-orifice of the duct *y* is opened to allow the fuel to escape. The stream of escaping oil strikes the partition J and fills the chambers *a* and *c*, flowing into the latter from the former through the opening *g* in the partition. The valve is closed and the oil in the well *a* is then ignited and the heat thus generated vaporizes the oil in the duct *y*. The lighting-cup and heating-chamber are then turned, so that the inlet *i* aligns with the valve-orifice of the duct *y*. The oil in the well *a* having by this time burned sufficiently low for the flame to pass through the opening *g*, the oil in the well *c* is automatically ignited. The valve-orifice of the duct *y* is then opened, allowing vapor to escape into the heating-chamber, and thence through the perforations of this chamber, and the vapor is ignited by the flame from the well *c*. The well *c* is made deeper than the well *a*, so that the oil in the well *c* may burn and thus be available after the oil in the well *a* is exhausted in supplying the initial flame for vaporizing the fuel in the duct *y*. This vertical partition J is turned at an angle at its outer end, so as to extend parallel with the outer side of the cup, and thus forms a stop, *j*, for striking against the casing of the valve H and limiting the movement of the cup and the lighting-chamber in one direction. Projecting from the inner side of the lighting-cup is an arm, K, which has its outer end turned upward just beyond the center of the orifice to the lighting-chamber, and which forms the stop to limit the movement of the lighting-cup and heating-chamber in the other direction. When the heating-chamber and lighting-cup are moved toward the right until the arm K stops the movement, the valve H stands just opposite the orifice to the heating-chamber, and then the vapor will be discharged directly into the chamber for the purpose of being ignited and heating the generating-chamber. When the lighting-cup and heating-chamber are turned toward the left until the flange strikes against the valve H, the cup is in position to be filled with liquid fuel preparatory to starting the generator. In this position the blaze is not liable to ignite the vapor in the side tube of chamber when the valve H is opened. The heating-chamber and generator are the same as shown in the Patents No. 275,677, dated April 10, 1883, and No. 324,947, dated August 25, 1885, heretofore granted to me, and need not be more fully described in this connection.

The flame from the heating-chamber impinging against the upper end of the stand-pipe D and against the under side of the generating-chamber L, secured to the top of the stand-pipe D above the heating-chamber, generates the vapor for all of the different burners, the tube of each one of which is provided with a valve, M, of its own. Rising from the side of the top of the generating-chamber L is the pipe N, through which the vapor for one of the burners issues. This pipe is screw-threaded at its lower end, so that it can be turned in any desired direction, and has its upper end elbow-shaped and provided with a nipple. By this construction its gas can be delivered to conducting-pipes or burners extending at any angle. Fastened to the upper outer end of this pipe, inside of the nipple, is the guard-plate O, which serves to deflect the heat rising from the generator toward this pipe N, and thus the pipe is in the line of the rising currents of heat and is kept hot thereby. As the pipe is thus kept hot by the rising currents of hot air, a plug, instead of a needle-valve, can be used. There may be any desired number of these pipes N rising from the generating-chamber, and each one will be turned at any desired angle.

The pipe P for the central burner rises from the center of the generating-chamber and is provided with the flange Q, which projects horizontally therefrom just below the nipple. Rising from this flange are the supports R for the induction-tube of the central burner. The nipple S for each burner is screwed into the pipe and is recessed on its face around the orifice, so as to prevent the orifice from becoming closed in case the nipple should be dropped, or while lying around ready to be attached to the other parts of the stove.

Having thus described my invention, I claim—

1. The combination of the stand-pipe, the central generator placed upon the upper end thereof, a pipe which conducts vapor from the generating to the heating chamber, the valve which controls the flow of vapor into the heating-chamber, the rotating heating-chamber, and the lighting-cup which is secured to the chamber, the chamber and the cup being adapted to be moved through an arc of a circle, substantially as shown.

2. The combination of the stand-pipe, the

central generator placed upon the upper end thereof, a pipe for conducting vapor from the generating to the heating chamber, the valve placed in this pipe, the heating-chamber placed on the stand-pipe, the lighting-cup fastened to the chamber, and the stops on the cup for regulating the distance the cup and the heating-chamber shall be turned upon the stand-pipe, substantially as described.

3. The combination of the stand-pipe, the central generator placed upon the upper end thereof, the heating-chamber placed upon the stand-pipe, a pipe for conducting vapor from the generating to the heating chamber, and the lighting-cup provided with the perforated partition J, and the two wells *a c*, substantially as set forth.

4. The combination of the stand-pipe, the central generator placed upon the upper end thereof, a support, E, placed on the stand-pipe, the heating-chamber placed upon the stand-pipe above the support and resting thereon, and the lighting-cup which is secured to the heating-chamber and projects beyond one side thereof, the heating-chamber and the lighting-cup being adapted to be turned through an arc of a circle in relation to the other parts of the burner and to move the receiving-nozzle of the chamber out of line with the valve, substantially as specified.

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

FORDYCE ALLEN LYMAN.

Witnesses:
F. E. BLISS,
D. C. HOWARD.