

(No Model.)

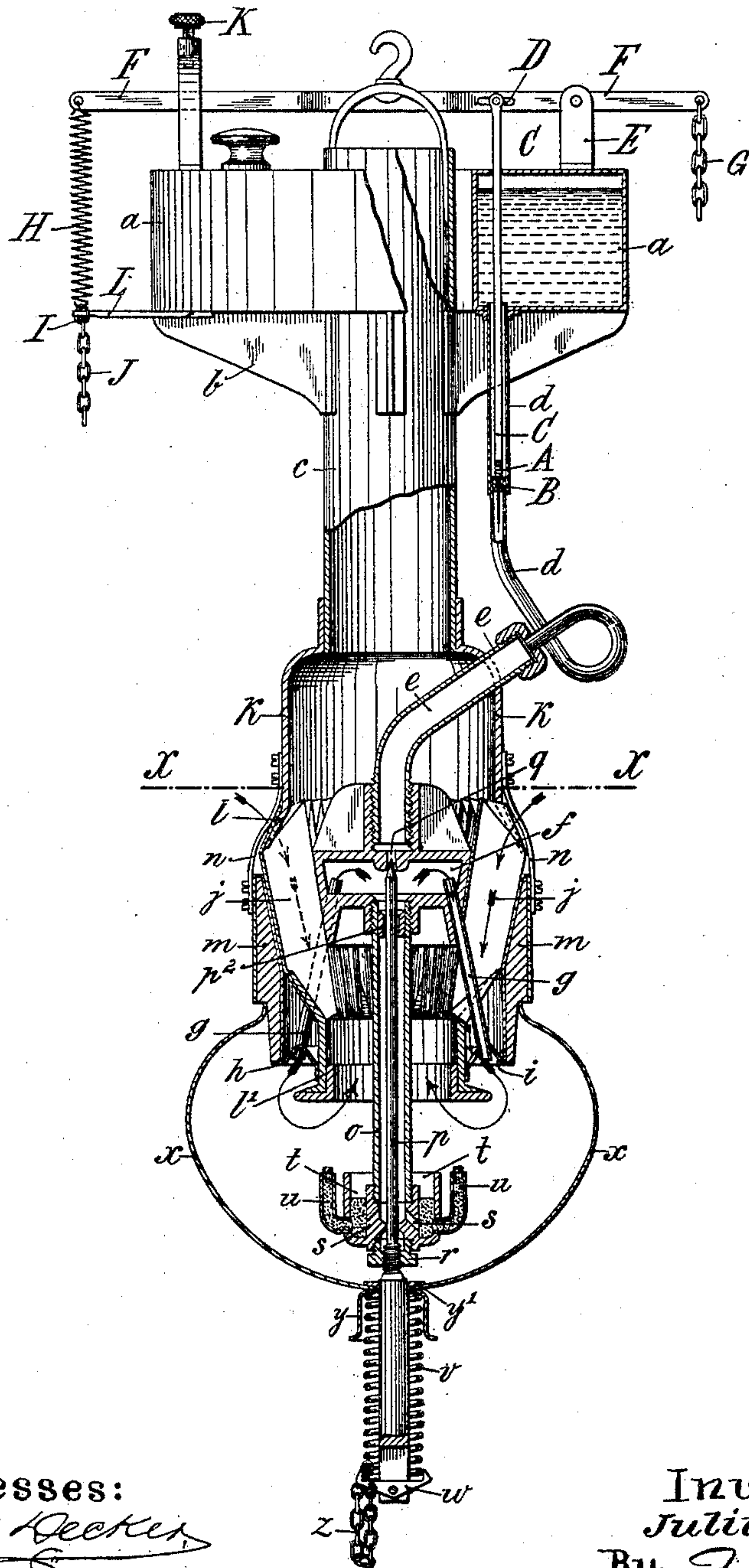
3 Sheets—Sheet 1.

J. SCHÜLKE.  
REGENERATIVE HYDROCARBON LAMP.

No. 474,192.

Patented May 3, 1892.

FIG. 1.



Witnesses:  
*Mark Decker*  
*H. M. Biddell*

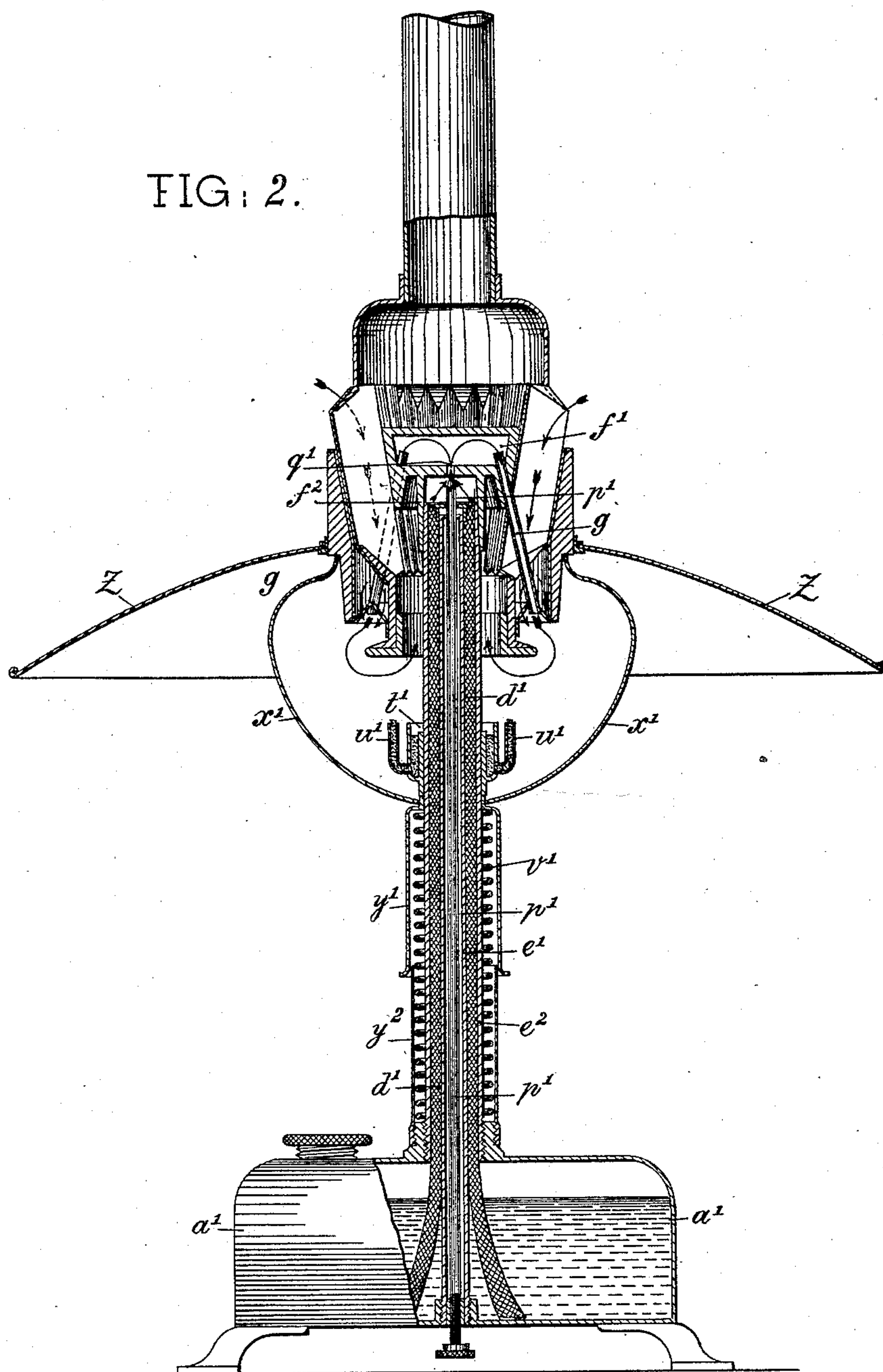
Inventor.  
*Julius Schülke.*  
By *J. W. Barker*  
Attorney.

J. SCHÜLKE.  
REGENERATIVE HYDROCARBON LAMP.

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FIG. 2.



Witnesses:

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(No Model.)

3 Sheets—Sheet 3.

J. SCHÜLKE.  
REGENERATIVE HYDROCARBON LAMP.

No. 474,192.

Patented May 3, 1892.

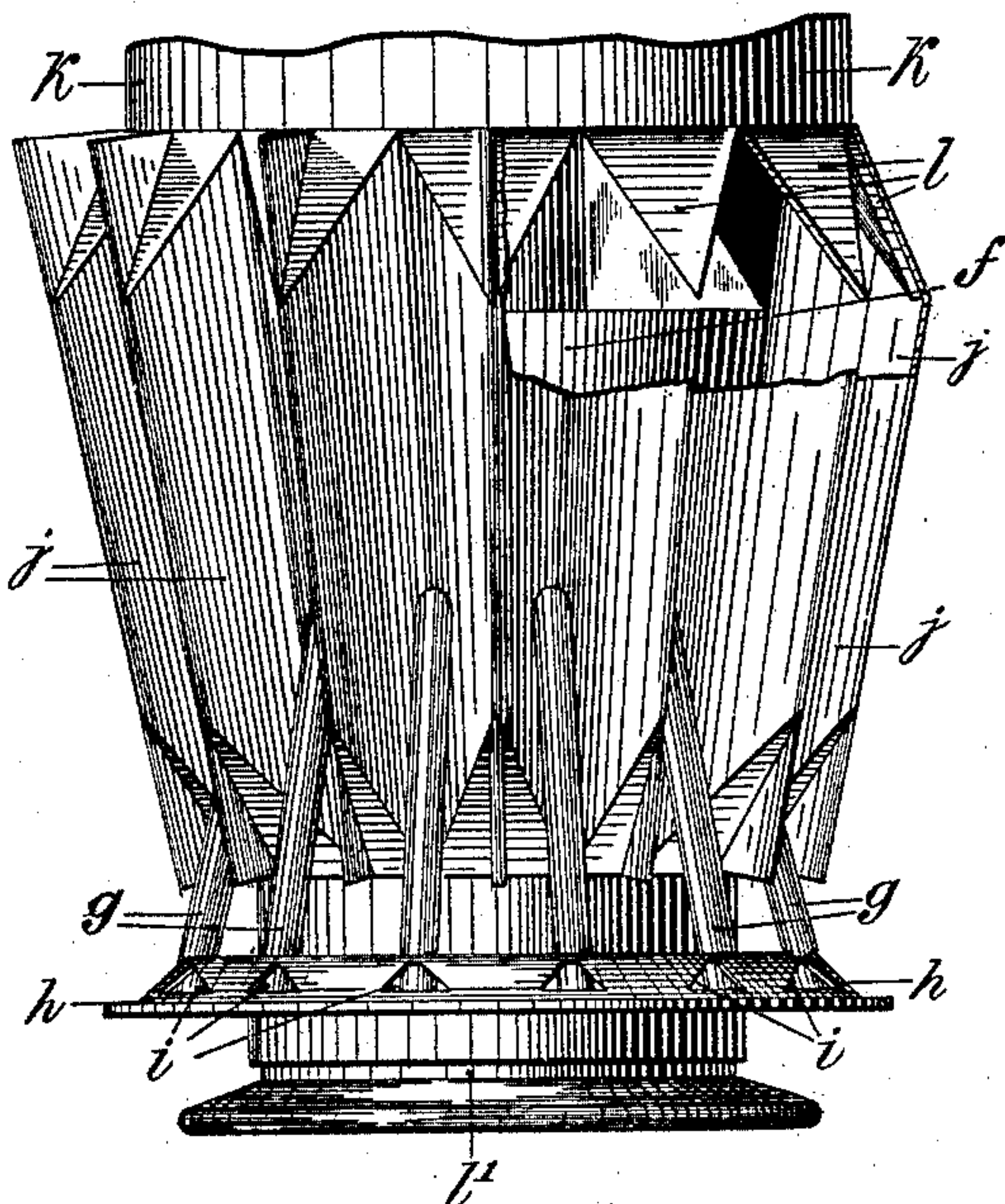


FIG. 3.

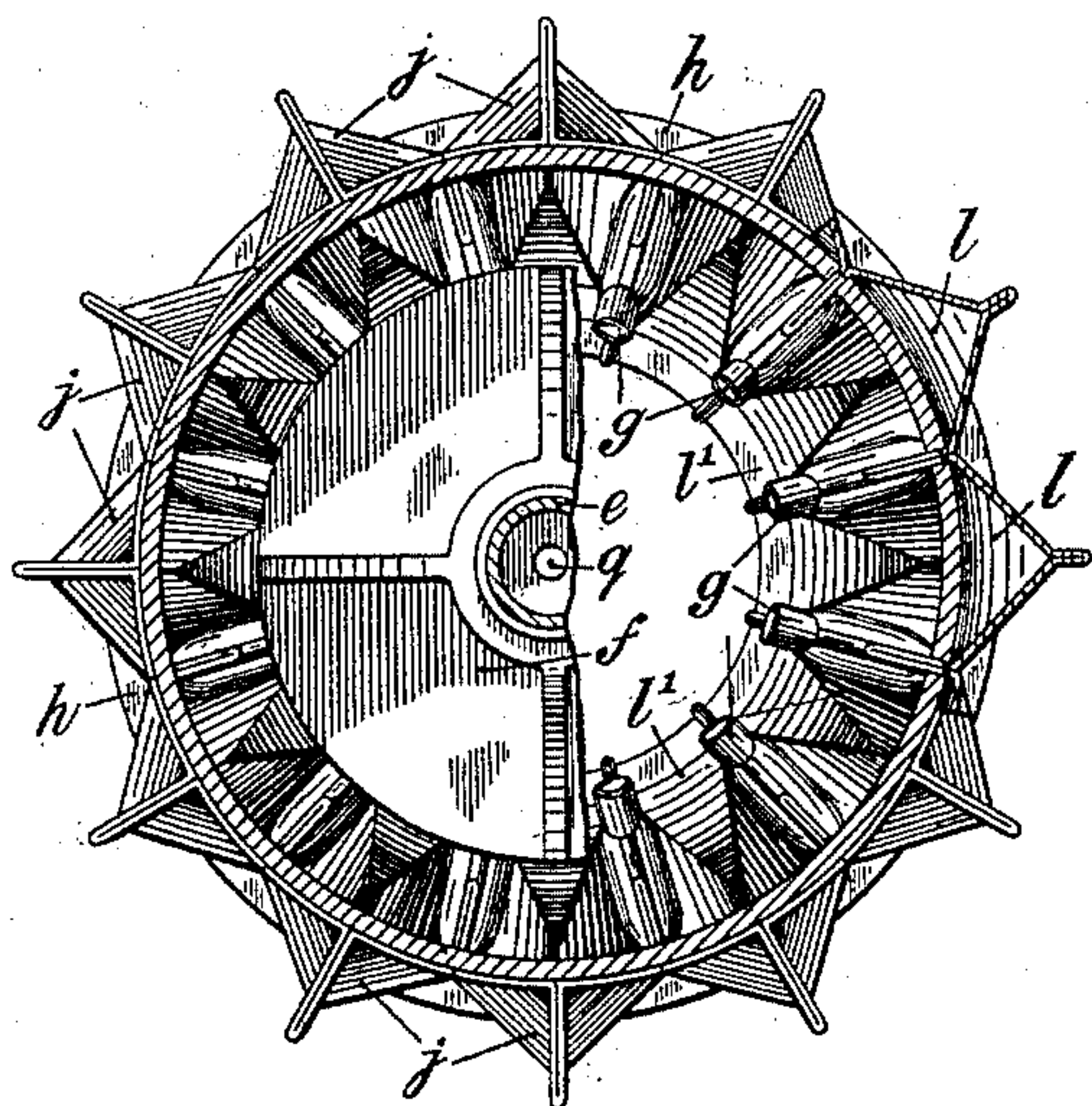


FIG. 4.

Witnesses:

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*Julius Schülke*  
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# UNITED STATES PATENT OFFICE.

JULIUS SCHÜLKE, OF GROSS LICHTERFELDE, GERMANY.

## REGENERATIVE HYDROCARBON-LAMP.

SPECIFICATION forming part of Letters Patent No. 474,192, dated May 3, 1892.

Application filed April 29, 1891. Serial No. 390,952. (No model.)

*To all whom it may concern:*

Be it known that I, JULIUS SCHÜLKE, a subject of the German Emperor, residing at Gross Lichterfelde, in the German Empire, have  
5 invented certain new and useful Improvements in Regenerative Hydrocarbon-Lamps, of which the following is a full and clear specification.

This invention relates to improvements in  
10 regenerative hydrocarbon-lamps in which the hydrocarbon is vaporized, or, in other words, in which the gasified hydrocarbon is burned.

Figure 1 is a vertical section, partly in elevation, of a suspended lamp with elevated  
15 reservoir. Fig. 2 is the vertical section of a table-lamp in which the reservoir is arranged in the foot of the lamp. Fig. 3 represents, on an enlarged scale, the folded tube for pre-heating the air used for promoting combustion and for utilizing the warmth of the spent  
20 gases, said tube being attached on the one hand to the chimney and on the other to the burner-ring. Fig. 4 is a horizontal section of Fig. 3 on the line  $x x$  in Fig. 1.

25 The construction of the suspension-lamp represented in Fig. 1 is as follows: The receptacle  $a$  for the hydrocarbon is provided with a feed-opening, which can be closed by a suitable screw-stopper or in other appropriate manner, and is preferably arranged  
30 around the chimney  $c$  and held by the brackets  $b$ . The said reservoir is also provided with an outlet-tube  $d$ , the appropriately-formed extension of which is connected to a vaporizing-retort  $e$ , the lower end of which is screwed or otherwise attached to a suitable piece of tubing or the tubular upper end of a preferably  
35 conical vaporizing-chamber  $f$ . This vaporizing-chamber is in communication with a series of annularly-arranged burner-tubes  $g$ , which preferably diverge outwardly toward their lower ends and enter a ridge-like or otherwise formed ring  $h$ , which I prefer to provide with perforations  $i$  for feeding air to  
40 the lower ends of the burner-tubes in order to attain a perfect combustion of the hydrocarbon gases.

50 The folded tube or mantle  $j$ , as shown in Figs. 1 to 4, surrounds the vaporizing-chamber  $f$  and is constructed of thin sheet metal, preferably nickel, which I prefer to bend in such manner that folds through which the

burner-tubes  $g$  pass are produced and which are at the upper and lower ends bent or folded together. The hood  $k$ , to which the chimney  
55 is fixed and which is pronged at its lower end, Fig. 3, is so attached to the folded sheet-metal mantle  $j$  that the prongs  $l$  of the hood gear between the folds of the said mantle  $j$ , while a burner tube or sheath  $l'$ , with prongs  
60 of like or similar form to those represented at  $l$ , are in gear with the lower folds of the mantle  $j$ . The lower end of the said sheath or tube can be strengthened by means of a piece of tubing with rectangular flange, or the sheath  
65 itself can be provided with such a flange, which reaches below the aforementioned ring  $h$ . The folded mantle  $j$  is surrounded by a second mantle  $m$ , of non-conducting material, such as asbestos, mineral wool, slag wool, or other  
70 suitable material, which is preferably suspended from the hood  $k$  by appropriate straps or bands  $n$ .

The vaporizing-chamber  $f$  has at its lower end a tubular projection or boss provided  
75 with screw-threads in order to receive the tube  $o$ , in which a spindle  $p$ , with conical tip, is guided, which said conical tip serves to close an opening or orifice  $g$  in the upper surface of the vaporizing-chamber and passes  
80 through a stuffing-box  $r$  in the lower end of the tube  $o$ . This tube communicates by means of the borings  $s$  with a cup-like receptacle  $t$ , provided with small tubes  $u$ , both receptacles and tubes being filled with asbes-  
85 tus or other appropriate material possessing capillary power.

The lower part of the spindle  $p$  is surrounded by a helical spring  $v$ , which presses on the one hand against a movable pawl  $w$  and  
90 on the other hand against a sheath  $y$ , between which and a disk  $y'$  the glass globe  $x$  is held, the upper edge of which is firmly pressed onto the lower surface of a shoulder to the asbestos or other mantle  $m$  or its mechanical  
95 equivalent.

The chain  $z$ , fixed at its one end to the helical spring  $v$  and at the other to the pawl  $w$ , and serves to hold the spring and the globe when the pawl  $w$  is given a vertical position, and  
100 the sheath  $y$ , spring  $v$ , and globe  $x$  are drawn down in order to ignite the lamp or clean the globe. The regulation of the feed of hydrocarbon from the reservoir  $a$  to the gasifying-



retort *e* takes place through a needle-valve A, arranged in an annular stopper B of the tube *d* and attached to a rod C, suspended in a slot D of the two-armed lever F, which has its fulcrum in the standard E. The one end of the lever F carries a chain G and at the other end a helical spring H, provided at its lower end with a ring I and chain J. The movement of the lever F upward and the consequent opening of the needle-valve by drawing on the chain G is limited by a set-screw K. The spiral spring H serves to produce a hermetic closure of the needle-valve, so as to prevent all escape of hydrocarbon when the lamp is not in use, and is for this purpose put under tension, the ring I being passed over the arm L of the reservoir.

If the lamp is to be used, the ring I is released from the arm L and the chain G of the needle-valve drawn downward, so as to open the said valve the desired distance.

The operation of the lamp is as follows: The cup-like receptacle *t*, with its small tubes *u*, is, after opening the needle-valve A and the orifice *q* by the spindle *p*, filled with hydrocarbon out of the reservoir or direct with hydrocarbon, spirit, or other appropriate matter, which now that the globe *x* has been drawn down is ignited.

By means of the heat generated by the flames from the tubes *u* the entire lamp is so heated that the hydrocarbon flowing through the tube *d* in a quantity which can be regulated at B will pass into the retort *e*, is evaporated, and passes from thence through the orifice *q* into the chamber *f*, where the same is gasified. The gas flows from the chamber *f* in the direction of the arrow, Fig. 1, into the tubes *g* and issues from the lower ends of the same where, after being intimately mixed with the air fed through the openings *i* in the ring *h*, it is ignited by the flames of the tubes *u* and is spread by the current of air.

The flames from the ring of tubes *g* produce a perfect ring of flame, which flows round the burner-ring *l'* inward. The products of combustion serve to heat the folded mantle *j* and the gasifying and vaporizing chambers, flowing through the folds of the mantle *j* to the hood *k* and to the chimney *c*. By means of the strong draft thus produced the energetic suction of air through the outer folds of the hot folded mantle *j* is caused, by means of which the air flowing into the lamp is highly and uniformly heated before it becomes mixed with the hydrocarbon gas, so that a perfect combustion and an absolutely-white flame are produced.

The object of the comparatively long tubular vaporizing-retort *e* is to produce differences of temperature, so that the hydrocarbon can flow in at the upper end without being immediately vaporized. The evaporation takes place on its way to the hotter part of the retort *e*, so that a sudden vaporizing, which occurs with superheated retorts and causes a jerking generation of hydrocarbon vapors

and a palpitation of the flame, is prevented, instead of which a uniform and regular vaporization and an absolute quiet burning of the flame are attained. When the flames have been lighted by the flames of the small tubes *u*, the latter become extinguished either on account of the fluid in the receptacle *t* being consumed or that the vapor in the vaporizing-chamber *f* passes through the tubes *g* instead of the annular way *p*<sup>2</sup> of the spindle *p*.

The arrangement of the table-lamp represented in Fig. 2 is substantially the same as represented in the pendent lamp, with the exception that the elevated reservoir and the regulating device for the feed of the fluid are omitted and the reservoir located in the foot of the lamp. The hydrocarbon is raised by the capillary attraction of a wick *d'* of preferably non-combustible material, arranged between the two tubes or sheaths *c'* *c*<sup>2</sup>, the upper ends of which are heated by the igniting-flames of the tubes *u'* and serve as a vaporizing-retort. The tubes *e'* *e*<sup>2</sup> are inserted in a tube-like extension *f*<sup>2</sup> at the lower side of the gasifying-retort *f'*, the chamber above the said tubes communicating with the retort by means of the orifice *q'*, which can be closed by the conical tip of the spindle *p'*. Through the excessive heating of the gasifying-retort *f'* the hydrocarbon vapor entering the same is, as described with reference to the aforementioned lamp, fed to a series of annularly-arranged tubes *g*, and, after having been mixed with air, is ignited by the flames of the small tubes *u'*. The igniting device consists of a cup-like receptacle *t'*, arranged around the tube *e*<sup>2</sup>, said receptacle being charged by hand with a small quantity of hydrocarbon, spirit, or the like. When this small quantity of combustible material is consumed, the flames will die out, and in the meantime the gasified vapors issuing from the tubes *g* will have become ignited and produce heat enough to continue the vaporizing and gasifying of the hydrocarbon. The helical spring *v'* for holding the globe *x'* in position is surrounded by the two sheaths *y'* *y*<sup>2</sup>, which glide one on the other. The lamp is also provided with a reflector Z for throwing the light onto the table or the like.

Having now particularly described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a lamp, the combination of a reservoir, a tube connecting said reservoir with a vaporizing-chamber, an adjustable orifice opening from said vaporizing-chamber to a gasifying-chamber, a series of annularly-arranged burner-tubes leading downward from said gasifying-chamber, and a folded mantle of thin sheet metal outside of and around the same, communicating with the outer air, so that the air entering said folded mantle from the outside shall deflect the flame at the mouth of said burner-tubes and cause said flame to turn inward and upward, substantially as described.



2. In a lamp, the combination of gasifying and vaporizing retorts which are heated by means of the products of combustion passing off, a folded mantle *j*, consisting of outer and inner folds, surrounded by an asbestos mantle *m*, the products of combustion being led upward through the inner folds of the mantle *j* to the head *k* at the same time that the air from the outside is being drawn downward through the outer folds thereof, by which means the said outer air is heated by its contact with the inner folds of the mantle, said outer air afterward flowing through the perforations *i* of the ring *h* to be fed to the flames formed at the ends of the tubes *g*, the head *k* carrying the chimney *c*, said head *k* being connected by a pronged ring *l* to the folded mantle *j*, substantially as described.

3. In a pendent lamp, the combination of a reservoir, a tube connecting said reservoir with a vaporizing-chamber, said tube having located within the same a valve *A*, an adjustable orifice opening from said vaporizing-chamber to a gasifying-chamber, a series of annularly-arranged burner-tubes leading downward from said gasifying-chamber, a folded mantle of thin sheet metal outside of and around the same and connecting with the outer air, and a pipe *o*, leading downward from said gasifying-chamber and communi-

cating with a small cup-shaped receptacle *t* and tubes *u* through borings *s*, said tubes and receptacle being filled with some non-combustible material possessing capillary power and being filled with hydrocarbon through their communication with the pipe *o*, substantially as described.

4. The device for regularly feeding the hydrocarbon or the like from the reservoir *a* to the retort *e*, consisting of the needle-valve *A* in the connecting-tube, the valve-rod *C* being connected to a two-armed lever *F*, having a limited stroke, and being provided with chains *G* *J*, the needle-valve being securely closed by a spring *H* when the ring *I* is attached to the arm *L*, Fig. 1, substantially as described.

5. The combination of the spring *v* for pressing the glass globe *x* onto the asbestos ring *m* with the movable pawl *w* and the chain *z*, so that the globe *x* and spring *v* are retained in position by the pawl *w*, substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JULIUS SCHÜLKE.

Witnesses:

EDWIN A. BRYDGES,  
EUSTACE W. HOPKINS.