

No. 726,747.

PATENTED APR. 28, 1903.

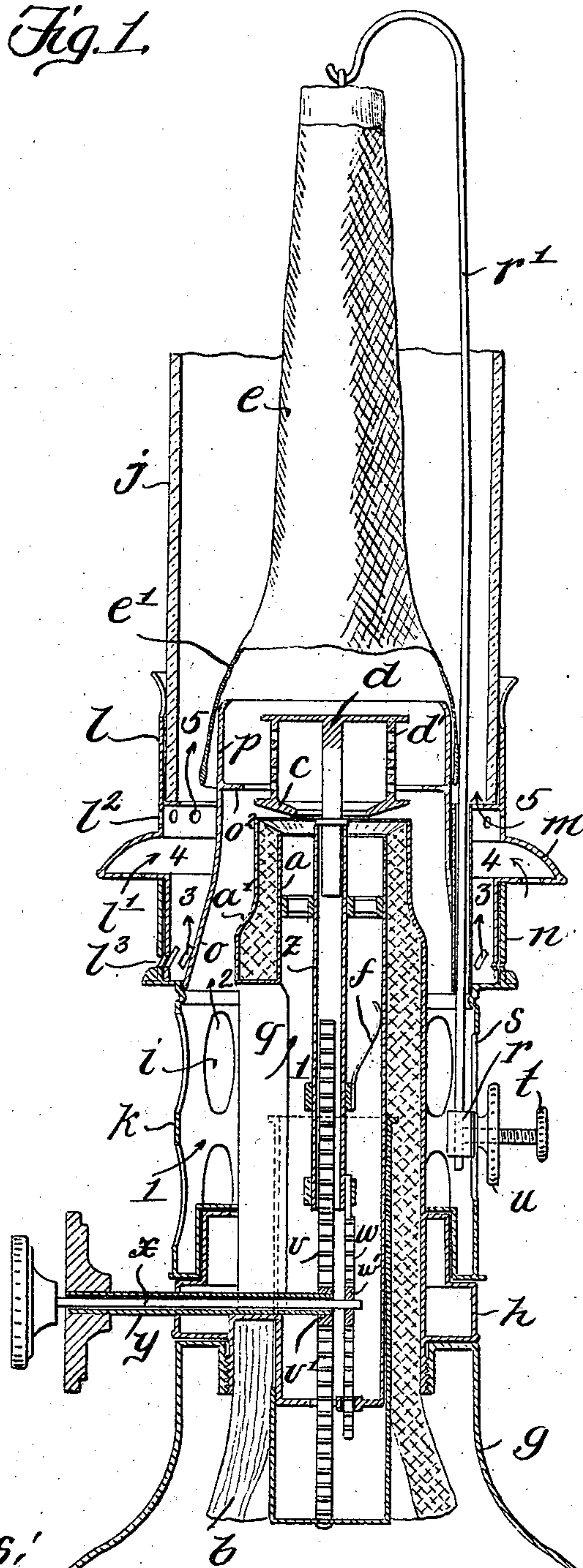
A. POEFFEL.
INCANDESCENT LAMP FOR LIQUID FUEL.

APPLICATION FILED NOV. 21, 1902.

NO MODEL.

8 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

James L. Norris Jr.

J. B. Keefe

Inventor

Arthur Poeffel

By

James L. Norris

Atty.

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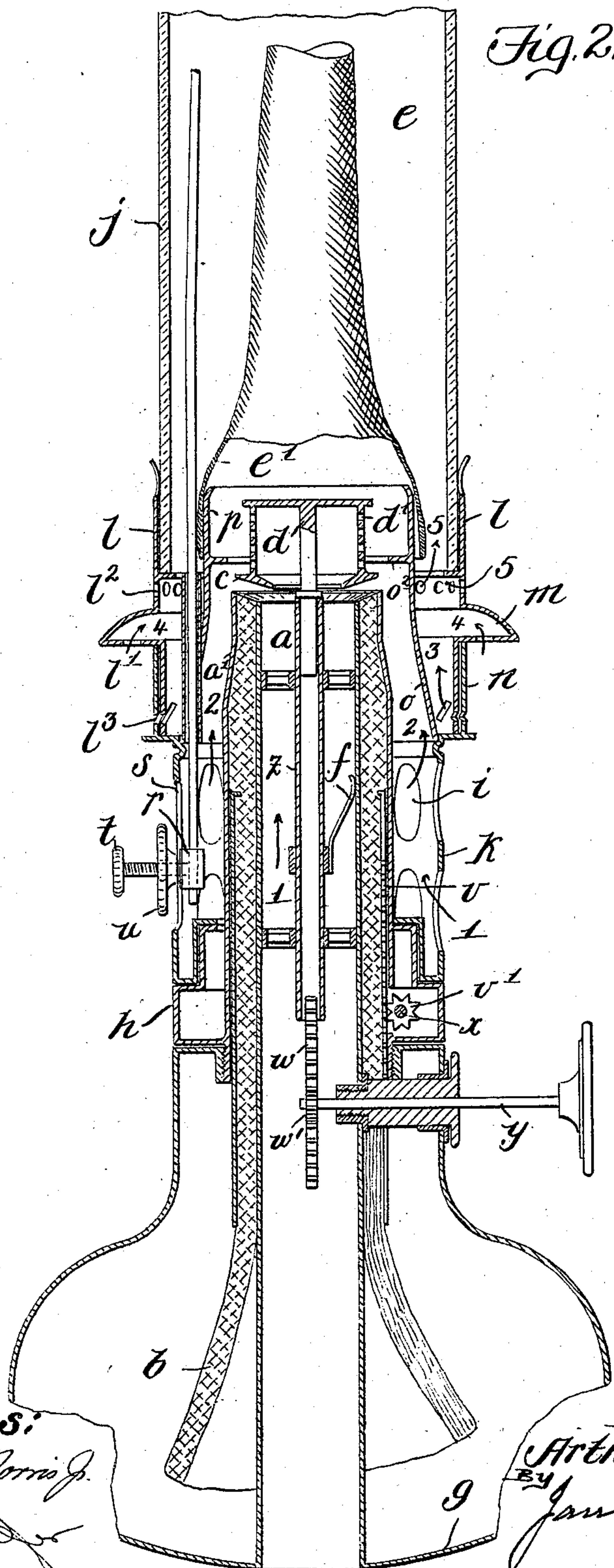
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3 SHEETS—SHEET 2.



Witnesses:
James L. Norris Jr.
J. B. Keefe

Inventor
Arthur Poeffel
By James L. Norris
Atty.

No. 726,747.

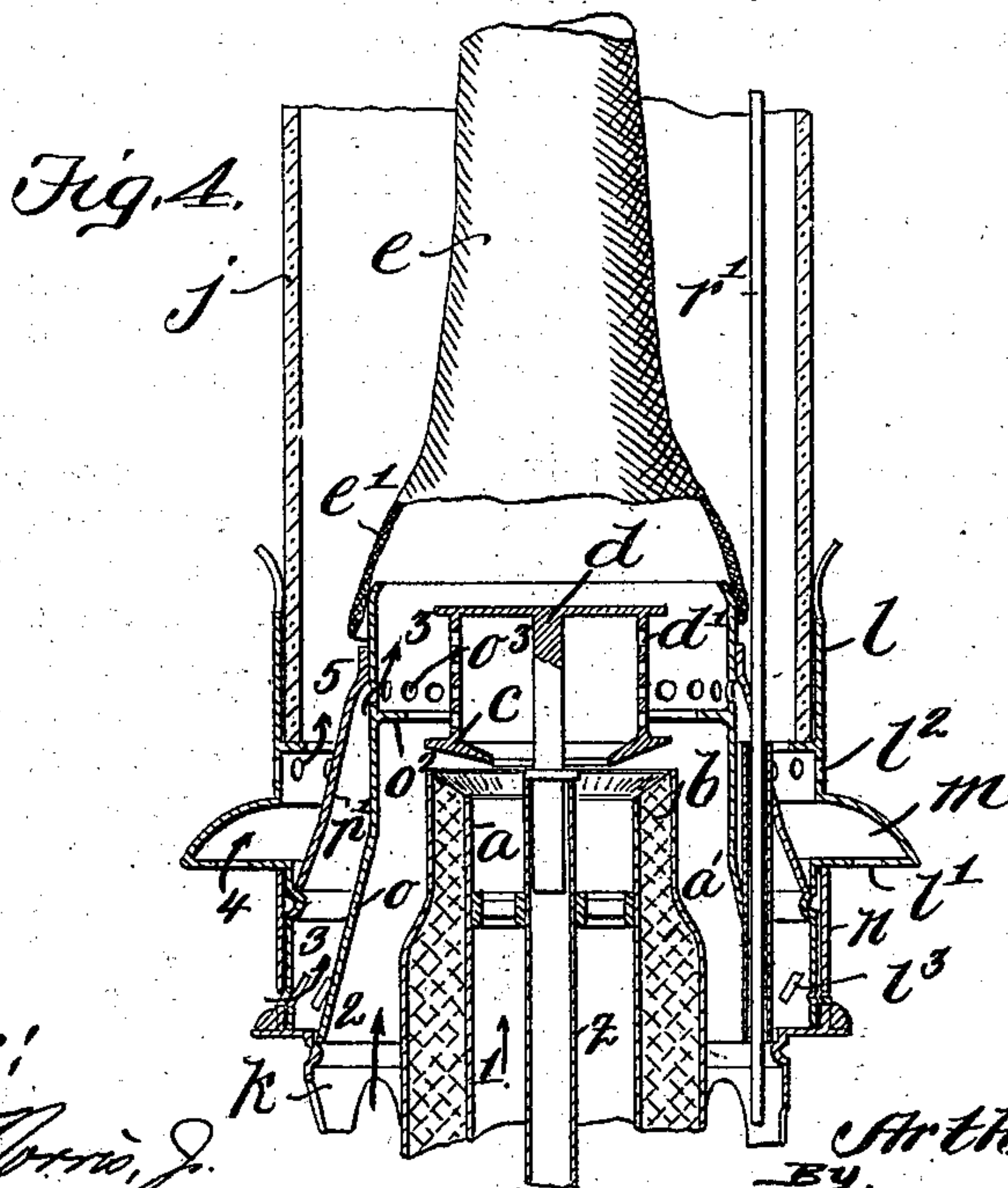
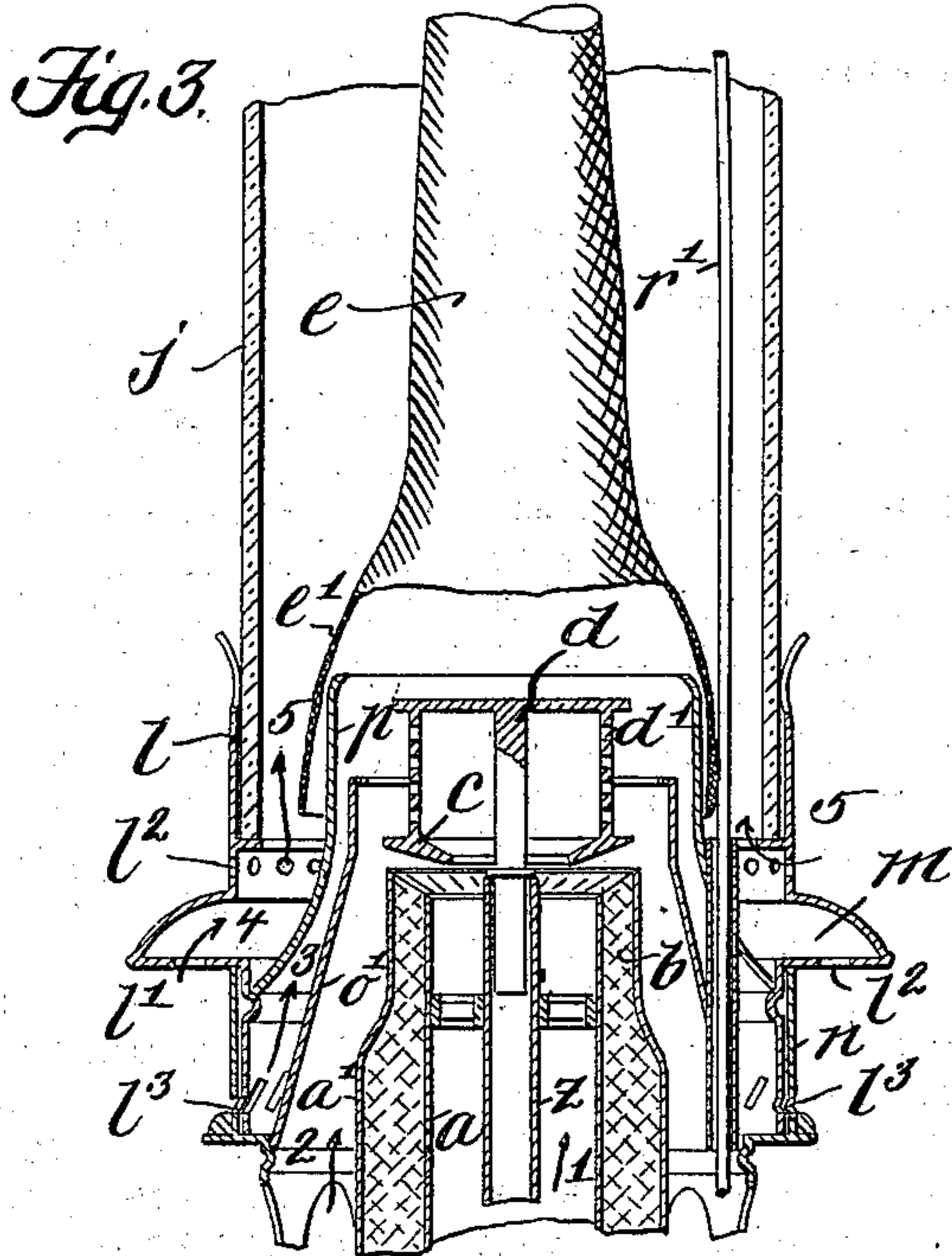
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8 SHEETS—SHEET 3.



Witnesses:
James L. Norris, Jr.
J. B. Keefe

Inventor
Arthur Poeffel
BY *James L. Norris*
Atty.

UNITED STATES PATENT OFFICE.

ARTHUR POEFFEL, OF LOSONCZ, AUSTRIA-HUNGARY.

INCANDESCENT LAMP FOR LIQUID FUEL.

SPECIFICATION forming part of Letters Patent No. 726,747, dated April 28, 1903.

Application filed November 21, 1902. Serial No. 132,315. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR POEFFEL, a subject of the Emperor of Austria-Hungary, residing at Losoncz, in the Empire of Austria-Hungary, have invented certain new and useful Improvements in Incandescent Lamps for Liquid Fuels; 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, reference being had to the accompanying drawings, and to letters and figures of reference marked thereon, which form a part of this specification.

The present invention relates to an incandescent lamp for liquid fuels in which the cold outer air in order to produce a better draft and a long flame has direct access to the latter between the outwardly and upwardly inclined combustion-surface of the wick and a flange having approximately the same direction situated on the lower edge of a gasifier (which can be adjusted while the lamp is in use) or on the edge of a likewise adjustable burner-disk, as well as through large apertures in a gallery which surrounds the burner-tubes. The supply of air is through the inner burner-tube, as well as from the outside of the outer burner-tube, the latter current of air being directed by a nozzle-shaped sleeve or burner-cap with a horizontal and inwardly-projecting constricted portion and extending up to the upper edge of the tulip-shaped core of the blue flame. This outer current of air and the inner current passing up through the inner burner-tube cause an upward deflection of the blue flame formed by the aid of these currents and at the same time its prolongation within the mantle. A further extension of the flame is produced by the jets of air which are drawn in at different levels through partly-adjustable apertures formed in the gallery of the chimney. Accordingly the mantle is longer than usual, and its flaring lower end is slipped over the nozzle-shaped sleeve or burner-cap. The mantle may be raised or lowered by a suitable device to adjust the extent of its surface which is exposed to the flame. The current of air passing up the outside of the mantle carries away the generated carbonic acid, so that the meshes do not become choked and the mantle does

not become sooty. Instead of the aforesaid sleeve or burner-cap there may also be used a burner-cap extending to above the annular slit between the wick and the gasifier-flange and provided on its upper edge with a horizontal and inwardly-projecting constricted portion and also a dome-like sleeve which surrounds the said burner-cap and extends up to the upper edge of the tulip-shaped core of the blue flame, the upper edge of this sleeve also forming an inwardly-projecting constricted portion. The said sleeve serves as a guide for jets of air entering through adjustable apertures in the chimney-gallery and passing up between the current of air along the outside of the outer burner-tube and the other jets of air drawn in through other apertures in the chimney-gallery, the former jets of air issuing into the interior of the mantle to deflect the flame in an upward direction and make it longer. Also the nozzle-like sleeve or burner-cap may have a series of holes above the flange which constricts the current of air passing up through it, so that cold outer air can be admitted through these directly to the blue flame. The supporting-rod of the gasifier-drum or burner-disk for the purpose of varying the annular slit between the wick and the aforesaid flange may be raised or lowered and is provided with a rubbing-spring that bears with a suitable pressure against the inner burner-tube to hold the rod securely in any position.

Figure 1 of the accompanying drawings is a vertical central section of a lamp constructed according to my invention, in which the air-supply is admitted to the interior of the inner burner-tube through a lateral aperture formed in the two burner-tubes. Fig. 2 is a similar section showing a modification in which the inner burner-tube extends through the fuel-container for admitting the air-supply to the interior of the inner burner-tube centrally from below. Fig. 3 shows a modified detail of the lamp in vertical section, which illustrates the shorter nozzle-shaped sleeve or burner-cap surrounded by a higher sleeve; and Fig. 4 shows also in vertical section an air-supply sleeve or burner-cap having holes arranged above the constricting-flange for the supply of cold air directly from the outside.

As will be seen from Figs. 1 and 2, the wick *b*, held between the burner-tubes *a* and *a'*, forms at its upper edge an outwardly and upwardly inclined surface, above which there is arranged at an adjustable distance the almost similarly-directed and therefore also inclined flange *c* on the lower edge of the gasifier-drum *d*. When a burner-disk is provided instead of the gasifier, the edge of the disk is formed like this flange. The raising of the wick for the purpose of bringing its upper inclined surface into the predetermined plane for igniting and also the raising of the gasifying-drum or burner-disk may be effected in the usual manner by means of rack-and-pinion gearing *v v'* and *w w'*, respectively, the spindles *x* and *y* of the pinions *v' w'* being arranged axially one within the other, Fig. 1, or in different planes, Fig. 2, as desired. For the purpose of securely holding the gasifier or burner-cap in any position the hollow rod *z* carries a rubbing-spring *f*, which bears with a suitable pressure against the inner wick-tube *a*.

On the lower part *h* of the burner, which is screwed on the fuel-container *g*, there rests the cylindrical gallery *k*, which can be placed over the wick-tubes *a a'* and has large air-inlets *i*. This gallery carries the chimney-gallery *l*. The latter is formed with a bulging part *m*, in which is a number of horizontally-arranged openings *l'*. The gallery also has a row of air-inlets *l²* arranged above the openings *l'* and another row *l³* below the openings *l'*. These last apertures *l³* are inclined slits and may be opened or closed by turning a sleeve *n*, having similar slits. The gallery *k* has a nozzle-like extension or sleeve *o*, which forms the burner-cap and extends up to the upper edge of the tulip-shaped core of the blue flame. In the burner-cap *o* there is at a little distance above the flange *c* or the edge of the burner-disk a horizontal and inwardly-projecting flange *o²*, which constricts the current of air rising between the burner-cap *o* and the outer burner-tube *a'*, thus increasing its velocity.

The air-supply to the interior of the inner burner-tube *a* may be either through a lateral aperture *q* in the burner-tubes, as in Fig. 1, or centrally from below in the case of lamps having an inner burner-tube extending through the fuel-container, as in Fig. 2.

The mantle *e* is longer than usual and is of almost cylindrical shape, having a pear or bell shaped flaring lower end *e'*. Its support *r'* is held in a socket *r*, which slides in a vertical guide *s* and can be fixed by a nut *u* on the set-screw *t*.

In the lamps shown in Figs. 1 and 2 there are five currents of air, which are represented by correspondingly-numbered arrows. The current 1 is the inner air-supply and passes through the apertures *i* and the lateral slit *q*, Fig. 1, or enters the lower end of the burner-tube *a*, Fig. 2, and passes up the latter and issues in part through the annular slit be-

tween the wick and the flange of the gasifying-drum *d* and in part through the holes *d'* of the latter or, if there is a burner-disk between the said disk and the wick, into the flame-cone. The inlet-aperture for the inner current of air is made so large that the unheated air can pass in without obstruction. The chimney *j* creates the necessary draft, and in order to increase the velocity of air as much as possible the burning-surface of the wick is made inclined, this being secured by arranging the upper edge of the inner burner-tube *a* two to three millimeters lower than the upper edge of the outer burner-tube *a'*. The flange *c* of the gasifier-drum *d* or the edge of the burner-disk is almost parallel with the burning-surface—that is to say, it is also inclined outwardly and upwardly. The air-current 1 is therefore less deflected and passes out more easily. This has the result, first, of cooling the inner burner-tube by the entering air, and thereby preventing superheating and superfluous generation of gas; second, of causing the unconsumed vapor generated by the flame to be carried up with great force, whereby the first condition for the production of a long flame is fulfilled. When a gasifier is used, that portion of the current of air which enters the gasifier-drum strikes the top thereof and after it has become highly heated passes through the holes in the periphery of the drum into the flame-cone. If the air which accumulates in the gasifier became superheated, an excess of gas would be generated and would not find sufficient air for complete combustion, so that incandescent particles of carbon would be deposited as soot upon the surface of the mantle or would fly upward as small sparks. This superheating may be obviated by raising the gasifier-drum *d* until its correct position has been found. If the drum is screwed up too high, the blue flame becomes red, which is a sign that its temperature has fallen.

The air-current 2 passes through the apertures *i* of the gallery *k* into the space between the outer burner-tube *a'* and the nozzle-shaped burner-cap *o*. In consequence of the large inlets *i* this air enters the said space without any particular hindrance and by reason of its great velocity produces an intense combustion of the hydrocarbons and an efficient cooling of the burner-tube *a'*. In this connection there is the advantage that almost the whole cylindrical surface of the outer burner-tube is exposed to the contact of not heated air. Owing to the extension of the cap *o* to the upper edge of the tulip-shaped core of the blue flame formed in all incandescent oil-lamps by well-known means, the draft of air is considerably increased, because it will be the more intense the higher the chimney. By the aid of the horizontal and inwardly-projecting constricted portion arranged in the burner-cap in a predetermined height above the gasifier or the burner-disk, respectively, the cross-section is de-

creased at a determined place, and thereby the velocity of the draft of air is considerably increased. In all lamps of this kind hitherto known the blue flame has the tendency to expand in width, and thus to become shorter. According to the invention the flame is compressed by the upper part of the cap, and in consequence of the constriction of the upper edge of the cap produced by the dome-like shape of the latter, which edge also forms an approximately horizontal inwardly-projecting constriction, the flame is simultaneously extended to considerable length. By this means the second and chief condition for an extended flame-cone is fulfilled. This extended flame-cone is a desideratum for the purpose of carrying off as rapidly as possible the products of combustion, which, together with a proper supply of air, conduces to the maximum heating value. It has been found by experience that the mantle has only a slight permeability for carbonic acid. Consequently if the products of combustion linger about the mantle combustion will be incomplete and the mantle will become sooty. This drawback might be avoided by increasing the combustion-space; but then the mantle would be out of the incandescing zone and the luminosity would decrease. This drawback is avoided by the extended flame-cone. The mantle is a high narrow cylinder flaring at its base. This form causes the wide flame to pass continuously into the upper part and shuts off the combustion-space. The long flame-cone greatly intensifies the heating, and the combustion-gases pass off with great velocity through the upper opening of the mantle.

The air-current 3 passes in the form of jets through the adjustable apertures l^3 of the chimney-gallery into the latter and passes up along the burner-cap o , becoming heated by the outer surface thereof. The air-current 4 passes, likewise in the form of jets, through the apertures l' of the chimney-gallery, unites with the air-current 3, and arrives in a heated condition at the outer surface of the flame-cone, which is thus lengthened still further. The apertures l' being horizontal, the upward suction of the air can occur much more freely than if they were vertical, in which case a change of direction would be necessary.

The air-current 5, which enters through the apertures l^2 and is split up into jets, prevents the upper part of the preliminary heating-chamber inclosed by the burner-cap o from being overheated, produces a further lengthening of the flame-cone, and, in combination with the air-currents 3 and 4, makes such a powerful current outside the mantle that the liberated carbonic acid which escapes through the meshes of the latter is carried off in an upward direction. As a new mantle contracts when it has been used for some hours, the lower part lifts away from the burner-cap o , and, owing to the entrance of a portion of the external air-currents into the mantle and

the irregular consumption of the oxygen of the said external currents caused thereby, the air within the mantle would vibrate, producing sound. The mantle is therefore made adjustable in height, as aforesaid, so that it may be lowered to close the combustion-space again.

The lamp is put in operation as follows: As soon as the wick (which is brought on a level with the upper edges of the burner-tubes and then fixed) is ignited the gallery k , the mantle, and the chimney are placed in position, and after the whole has warmed slightly the gasifier-drum is adjusted. At this moment the air-currents come into operation, as hereinbefore described. When overheating of the air occurs in the gasifier-drum d or in the preliminary heating-space of the air-current 2, (the former being indicated by deposition of carbon on the upper part of the mantle and the latter by the jumping of the flame analogous to gas incandescent lamps at diminished pressure,) a cooling effect may be caused by raising the gasifier-drum or by turning the sleeve n . As shown in Fig. 3, instead of the burner-cap o there may be used a cap o' , which extends up to about half the height of the perforated surface of the gasifier d and is provided at its upper edge with a horizontal and inwardly-projecting constricted portion. This cap may be surrounded by a sleeve p , which is built in the chimney-gallery and extends up to the upper edge of the tulip-shaped core of the blue flame, the upper part of the sleeve being dome-shaped, so that the upper edge of the sleeve also issues into an approximately horizontal and inwardly-projecting constriction. The air-current 3, drawn in through the adjustable apertures l^3 and divided into jets, enters in this case into the space between the burner-cap o' and the sleeve p , where it is heated up. The spreading of the flame burning at the upper edge of the cap o' is prevented by the sleeve p , which deflects the flame upwardly and compresses it while it is lengthened by the air-current 3 still more considerably than by the air-current 2, which is led up inside the burner-cap o' along the burning-surface of the wick, where only gasification happens. Adjusting the apertures l^3 by sleeve n prevents overheating in the space between the cap o' and the sleeve p . Since the air-current 3 in this arrangement also enters the interior of the mantle which rests on the sleeve p and should be adjusted relatively thereto, only the air-currents 4 and 5 come in operation on the outside of the mantle, as already described.

As shown in Fig. 4, the burner-cap o may also have above the flange o^2 a row of holes o^3 , admitting cold outer air directly to the flame. For this purpose the air-current 3 is separated from currents 4 and 5 by a conical partition p' , which fits at one end close up against the burner-cap o and at the other end is mounted on the chimney-gallery l , so that the air-jets 3, entering through the adjust-

able slots l^3 , are led below the partition p' to the holes and pass through these into the space between the burner-cap and the gasifier-drum, where they increase the velocity of the air-currents 1 and 2 and while deflecting the flame upward produce a further lengthening thereof within the mantle that bears against the burner-cap o .

I claim—

- 10 1. An incandescent burner for liquid fuel comprising an inner and outer wick-tube having their upper edges in different planes whereby the wick may be provided with a flame-surface having an upward and outward
15 incline, a gasifier located above the wick-tubes and provided on its under side with a surface adapted to extend substantially parallel with the flame-surface of the wick, a burner-cap surrounding the upper portion of
20 the outer wick-tube and said gasifier, a mantle having its lower end surrounding said burner-cap, and means for admitting air to the interior of the inner wick-tube and between the outer wick-tube and said burner-cap.
- 25 2. An incandescent burner for liquid fuel comprising an inner and an outer wick-tube having their upper edges in different planes whereby the wick may be provided with a flame-surface having an upward and outward
30 incline, a gasifier comprising a hollow perforated drum having an open bottom provided with an inclined flange adapted to extend substantially parallel to the flame-surface of the wick, said gasifier being adjustably
35 mounted above said wick-tubes, a burner-cap surrounding the outer portion of said outer wick-tube and extending above said gasifier and having an inward-extending annular flange located above the lower edge of
40 said gasifier, a mantle having its lower portion surrounding said burner-cap, and means for admitting air to the interior of said inner wick-tube and between the outer wick-tube and said burner-cap.
- 45 3. An incandescent burner for liquid fuel comprising an inner and an outer wick-tube, a gasifier located above said tubes, a burner-cap surrounding the upper portion of the outer wick-tube and said gasifier and having
50 a contracted opening in its upper end and provided with an inward-extending annular flange located above the lower edge of said

gasifier, a mantle having its lower portion encircling the upper end of said burner-cap, a chimney-gallery provided with air-inlets, 55 means for admitting air to the interior of the inner wick-tube, means for admitting air between the outer wick-tube and said burner-cap, and means for regulating the amount of air passing through the air-inlets of the chimney-gallery to the outside of said burner-cap. 60

4. An incandescent burner for liquid fuel comprising an inner and outer wick-tube, a gasifier located above the upper edges of said tubes, a burner-cap surrounding the upper 65 portion of the outer wick-tube and said gasifier, and having a contracted opening in its upper end, and provided with an inward-extending annular flange located above the lower edge of said gasifier, a sleeve surrounding said burner-cap, a mantle having its lower end encircling the upper portion of said burner-cap, and means for admitting air to the interior of the inner wick-tube, between 75 the outer wick-tube and the burner-cap, between the burner-cap and said sleeve, and to the exterior of the mantle.

5. In an incandescent burner for liquid fuel, in combination with the inner wick-tube, a rod slidably mounted in said inner wick- 80 tube, a gasifier mounted on the upper end of said rod, means for raising and lowering said rod, and a rubbing-spring carried by said rod and adapted to bear on the inner surface of said wick-tube for the purpose described. 85

6. In an incandescent burner for liquid fuel, in combination with the mantle, a support therefor comprising a gallery having a vertically-disposed slot, a socket slidably mounted in said slot, a rod having the mantle 90 supported from its upper end and having its lower end slidably mounted in said socket, a set-screw for binding said rod in said socket, and a nut working on said set-screw for binding the socket in position in the slot of the 95 gallery.

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

ARTHUR POEFFEL.

Witnesses:

FRANK DYER CHESTER,
LOUIS VANDORN.