

No. 750,438.

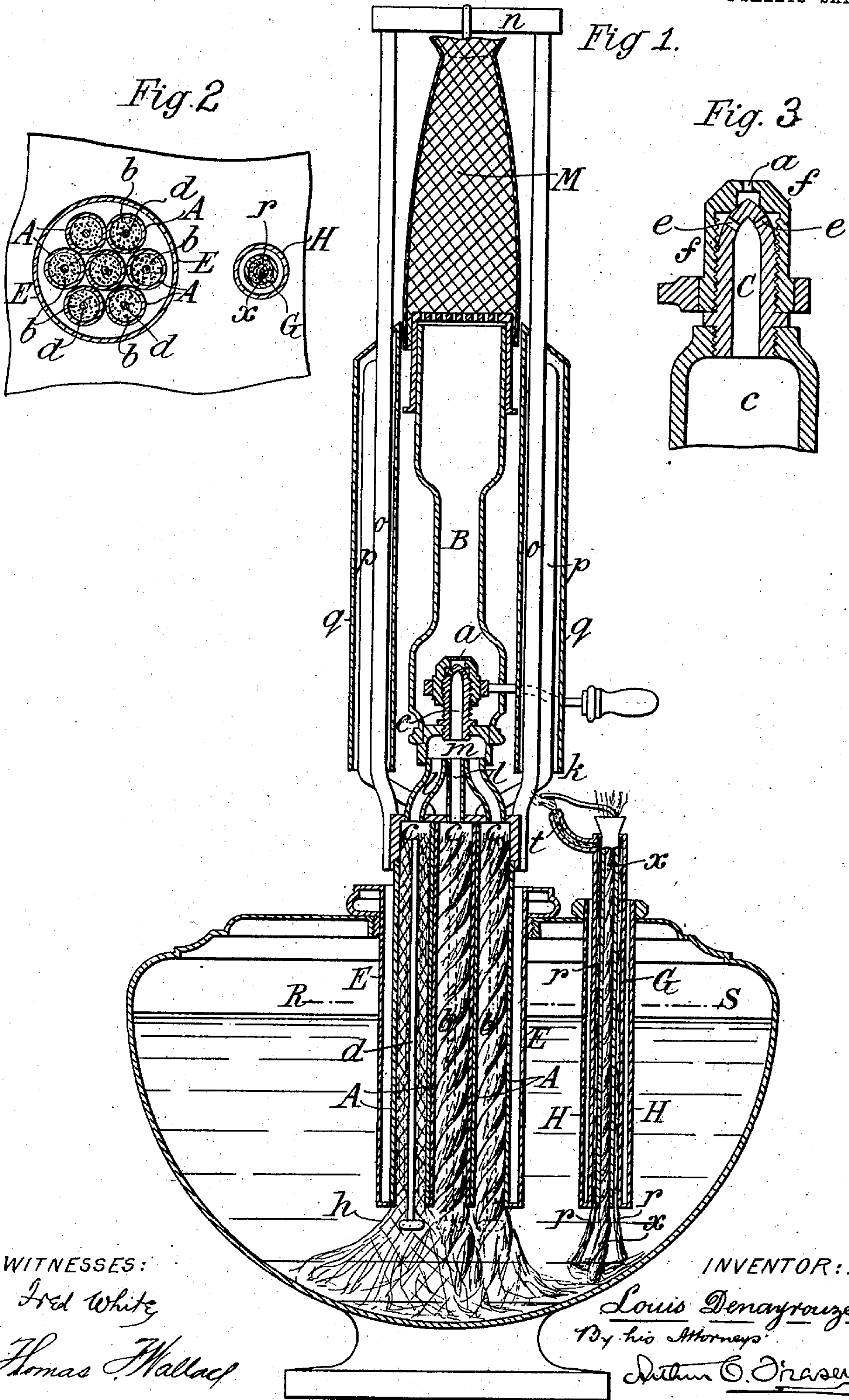
PATENTED JAN. 26, 1904.

L. DENAYROUZE.
INCANDESCENT VAPOR LAMP.

APPLICATION FILED MAR. 5, 1902.

NO MODEL.

4 SHEETS—SHEET 1.



WITNESSES:

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Thomas Wallace

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By his Attorneys

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4 SHEETS—SHEET 2.

Fig. 4.

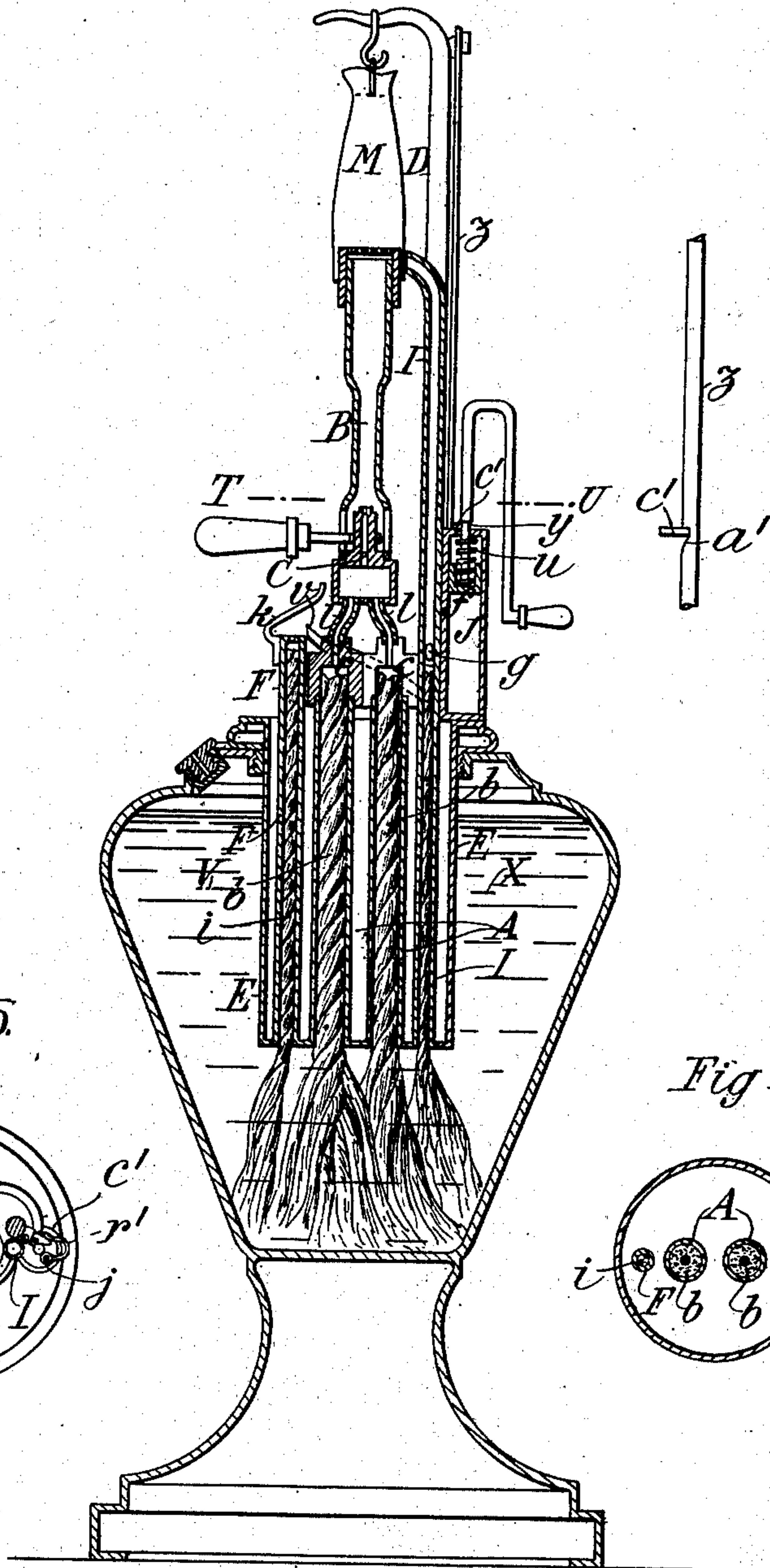


Fig. 5.

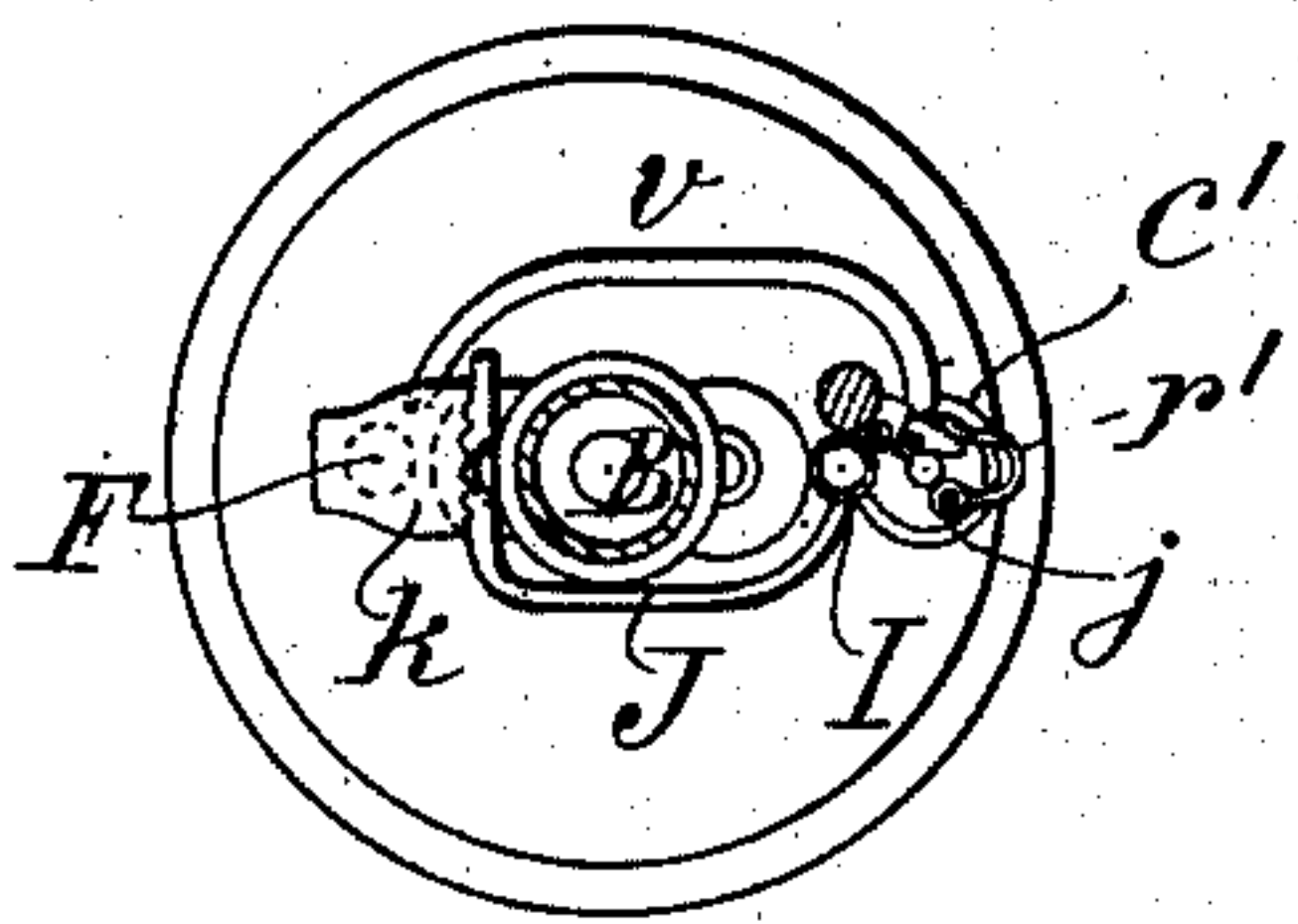
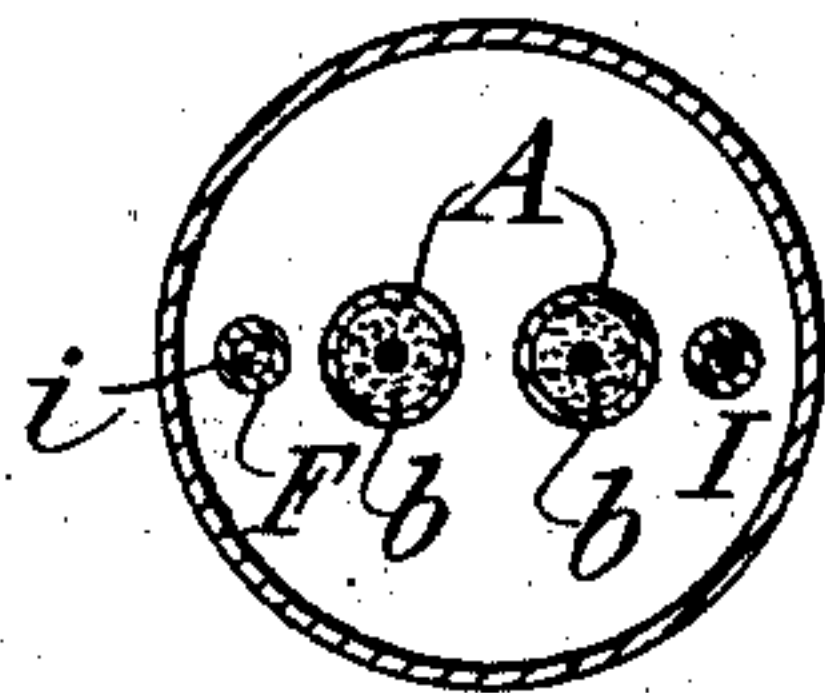


Fig. 6.



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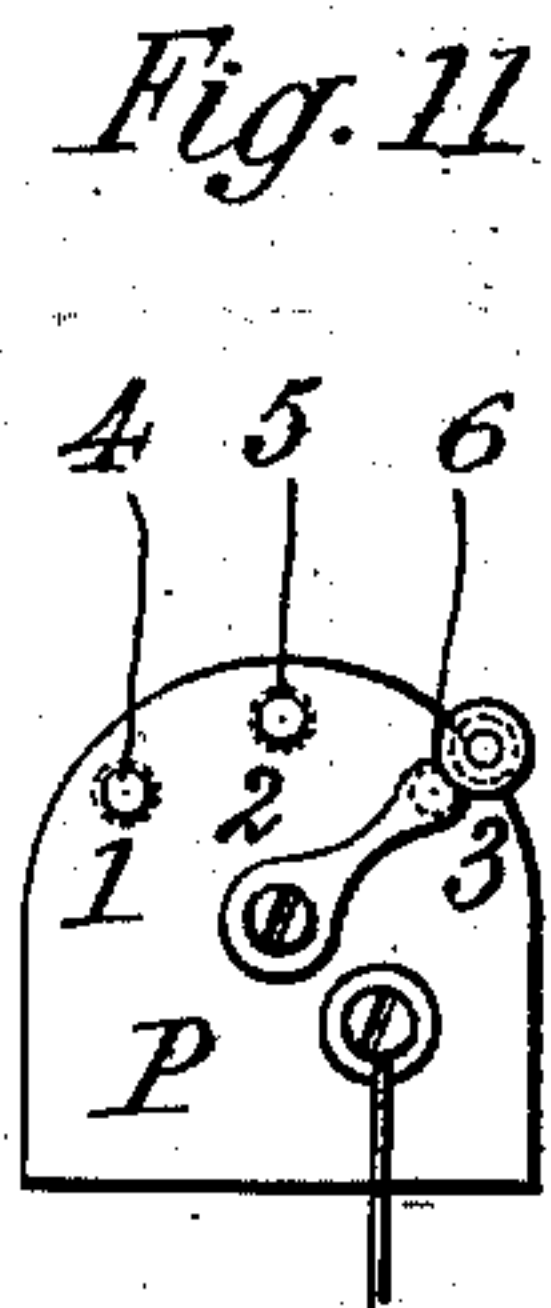
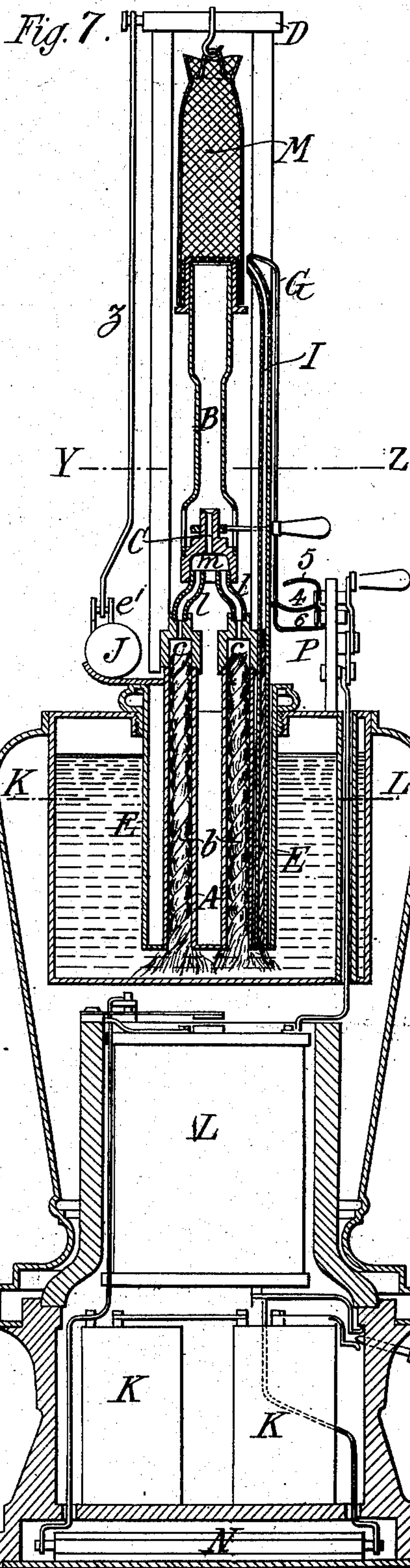
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4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

Fig 9.

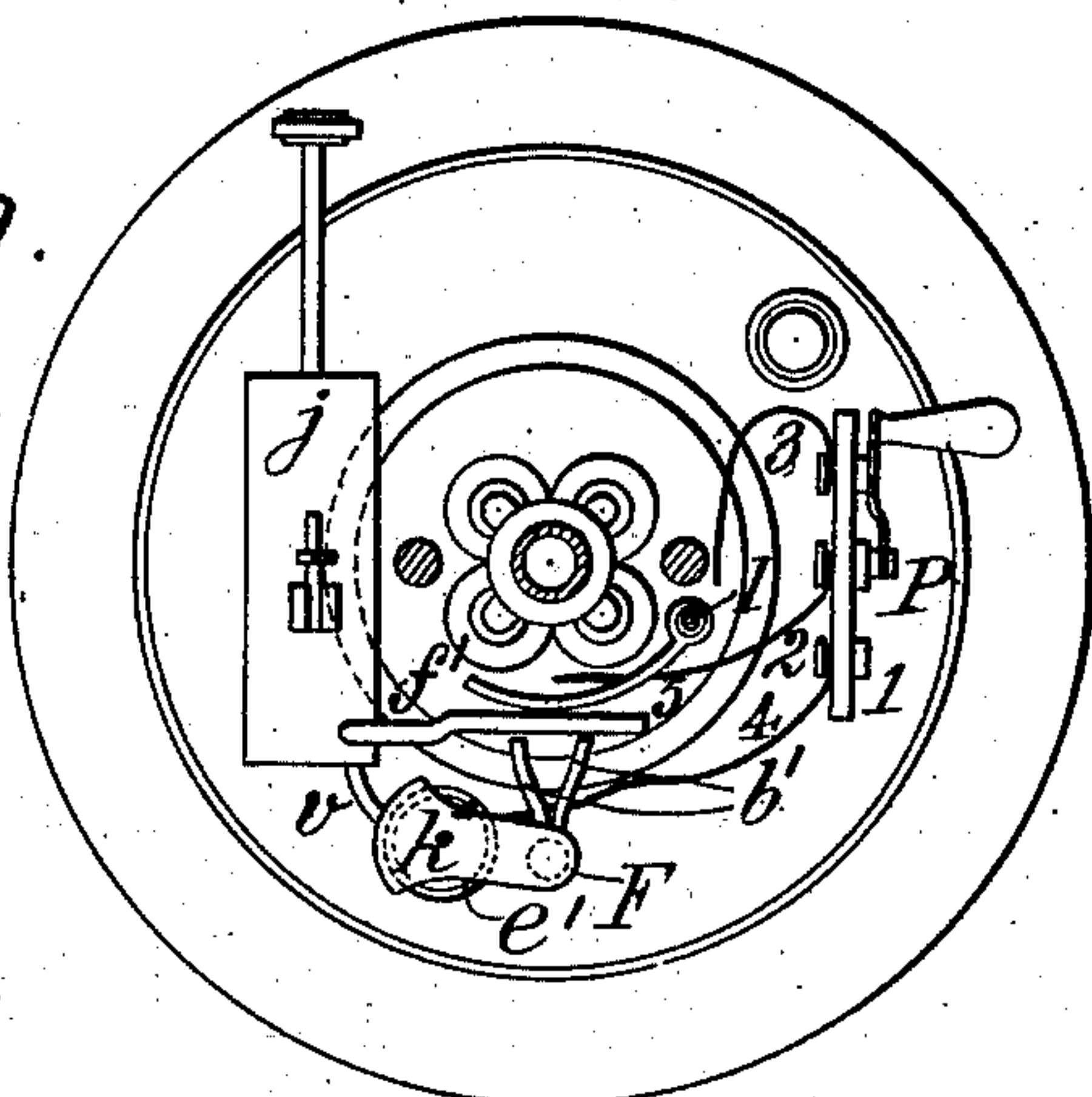


Fig. 8.

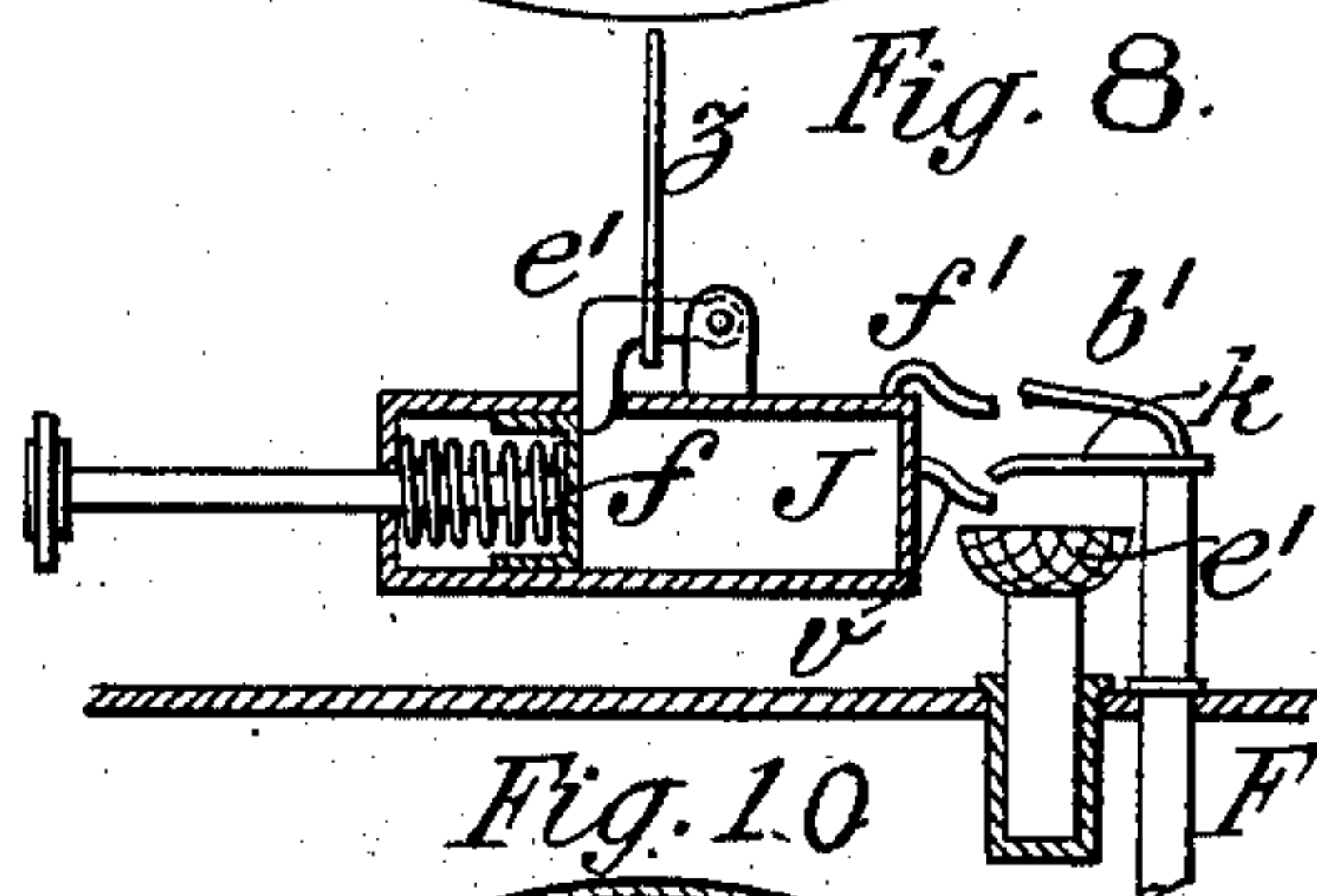


Fig. 10

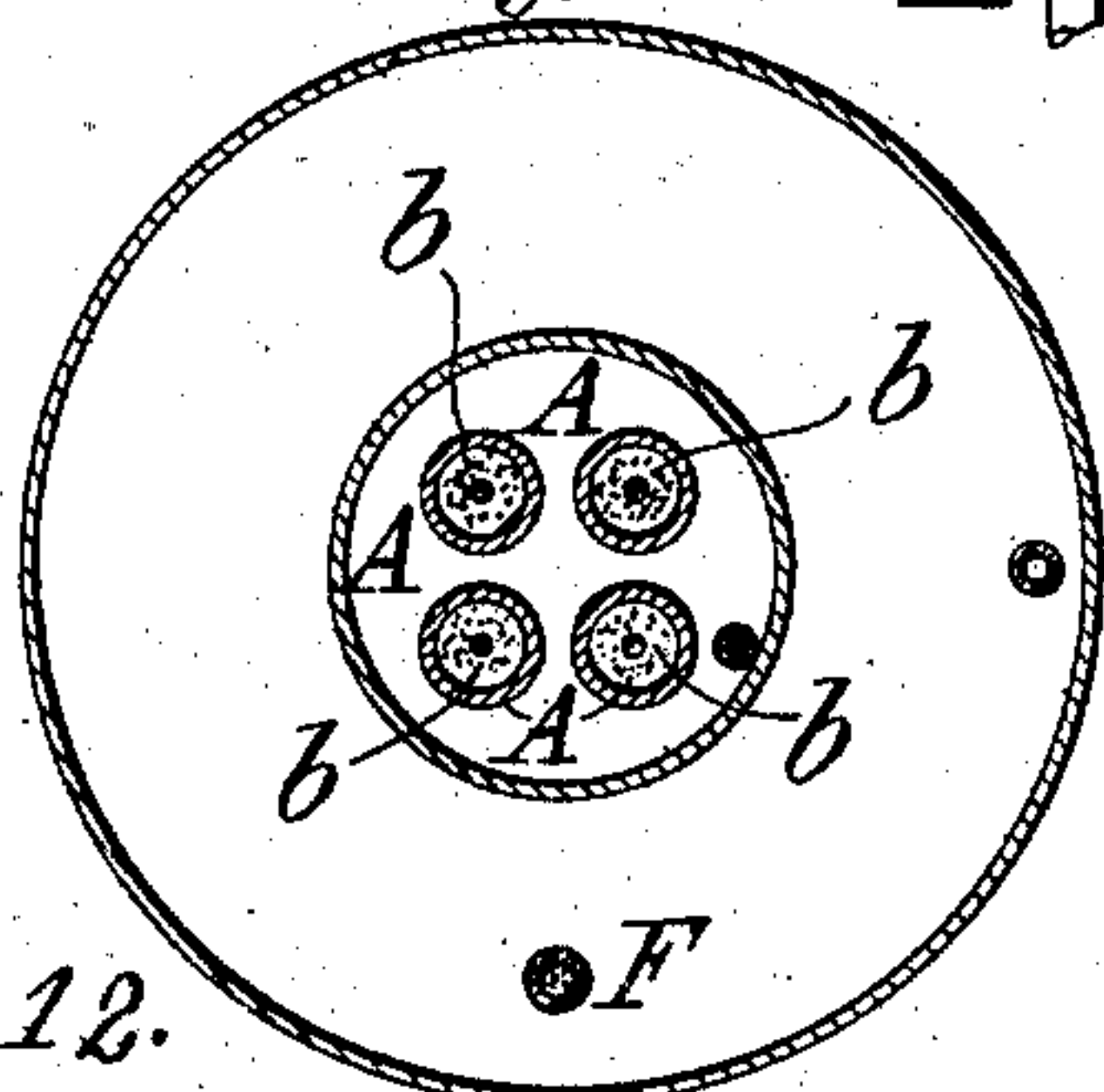
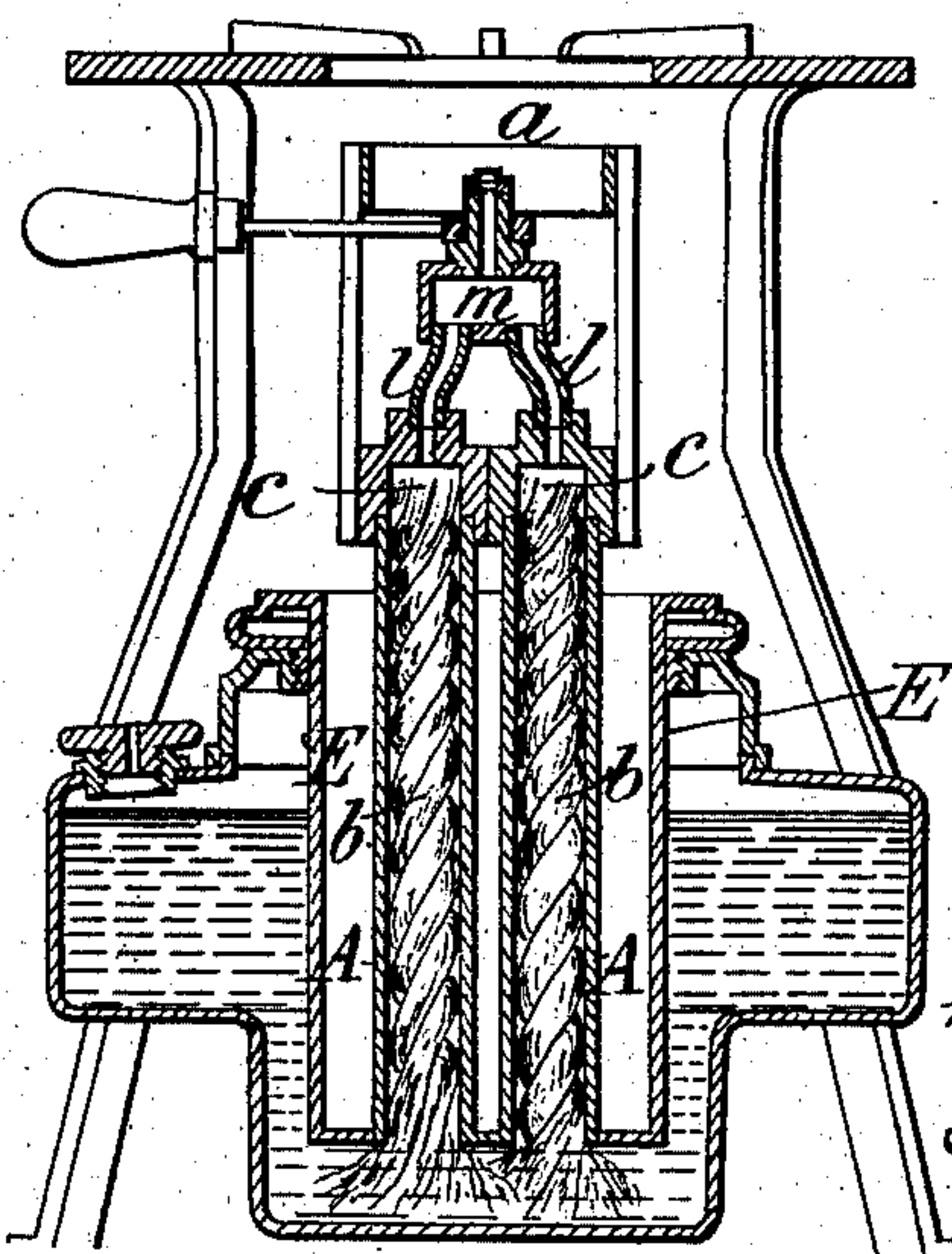


Fig. 12.



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UNITED STATES PATENT OFFICE.

LOUIS DENAYROUZE, OF NEUILLY, FRANCE.

INCANDESCENT VAPOR-LAMP.

SPECIFICATION forming part of Letters Patent No. 750,438, dated January 26, 1904.

Application filed March 5, 1902. Serial No. 96,741. (No model.)

To all whom it may concern:

Be it known that I, LOUIS DENAYROUZE, a citizen of the Republic of France, residing at Neuilly-sur-Seine, Seine, France, have invented certain new and useful Improvements in Incandescent Vapor-Lamps, of which the following is a specification.

In my patent of August 8, 1900, I describe lamps which produce incandescence of a refractory mantle by the combustion of a mixture of air and vapor of a volatile hydrocarbon liquid, especially alcohol, essence of petroleum, and petroleum. My present invention provides certain improvements especially applicable to the type of lamp there described.

I shall explain with reference to the annexed drawings certain embodiments of the invention. The claims hereinafter set forth the features of novelty.

Figure 1 of the drawings shows a lamp fed by seven wicks arranged in seven casings. Fig. 2 is a horizontal section on the line R S of Fig. 1. Fig. 3 is a section, drawn to an enlarged scale, of the nozzle for issue of the vapor. Fig. 4 is a section of a lamp having an arrangement for producing a preliminary light until the vaporization is sufficient to effect the complete incandescence of the mantle. Fig. 5 is a horizontal section on the line T U of Fig. 4, and Fig. 6 is a section on V X. Fig. 7 is a vertical section of a modified lamp with an arrangement for lighting electrically. Fig. 8 is a side view of the upper part, showing the extinguishing mechanism. Fig. 9 is a horizontal section on Y Z, and Fig. 10 is a section on the line K L. Fig. 11 is a side view showing the lighting-commutators. Fig. 12 is a vertical section of a furnace arranged according to the same system.

Each of several wicks *b* is very tightly squeezed in a tube A of German silver, which is a bad conductor of heat, a small space *c* being left above the wick. This tightly-squeezed wick allows the liquid to ascend by capillary action, but prevents backflow of gas produced in *c*, so that this gas cannot descend into the body of the lamp. Further, as the German-silver tube A is a non-conductor, the heat of the lamp cannot be transmitted to the body which contains the liquid. There is there-

fore in the lamp-body neither gas nor vapor transmitted by the wick nor vapor due to the heat of the gas. Should a little vapor penetrate the interstices of the upper part of the wick, it is soon condensed by the low temperature of the German-silver tube A.

Each wick is widely spread out at its lower part in the liquid, so as to be thoroughly impregnated. A metal rod is passed up the middle of the wick to facilitate its introduction into the tube A and its removal therefrom. This rod has a button-head at its lower end.

In the case of a single-wick lamp the tube A is surmounted by a nozzle C, which terminates in a point and has through its head several small holes for escape of the hydrocarbon vapor.

The nozzle C is screw-threaded to receive a sheath *f*, provided inside with a shoulder to bear against the pointed end of the nozzle C, so as to throttle more or less the holes *e*. The sheath *f* has at its top a hole *a*, by which the hydrocarbon vapor issues at the bottom of the Bunsen tube B. Above the burner the mantle M is suspended from a bent rod D, of well-conducting metal, the lower end of which is fixed to the chamber *c*, which is entered by the upper end of the wick *b*. The rod D catches heat produced by the incandescence of the mantle and conducts the heat to the chamber *c* for vaporization of the liquid. The German-silver tube A, where only one tube is used, or the entire group, where several are used, is surrounded by another tube E, which forms around A an insulating-space closed at the bottom. In this space is arranged a tube F, containing a wick *z*, which constitutes the starting-heater. For this purpose the upper part of the tube F carries a small metal plate *k*, which is heated by the flame kindled at the top of the wick *z*. This plate *k* as it is heated deflects the flame under it toward the chamber *c*, and this very soon causes vaporization of the oil which has been raised by capillary action to the top of the wick *b*. This vapor escapes by the nozzle into the Bunsen tube, drawing in air, and issues under the mantle M, where it is lighted.

By grouping a less or greater number of wick-tubes A, each holding a squeezed wick,

as shown in Figs. 2 and 3, a large-flame lamp is obtained. In the figures the seven tubes or wick-casings open into seven small chambers *c*, from each of which proceeds a tube *l*, and these seven tubes meet in a common chamber *m*, which has the nozzle for issue of the vapor produced. The nozzle is furnished with the extinguishing-regulator described above and shown to a large scale in Fig. 3. In this lamp having several wicks there is, as before, an enveloping-tube *E*, closed at the bottom, forming an insulating-space.

The mantle *M* is suspended from a cross-head *n*, carried by two rods *o*, which extend to the vaporizing-chamber *c*. Other rods *p p*, connected to the former, are attached to other of the vaporizing-chambers, so as to increase as much as possible the amount of heat thus transmitted for vaporizing. A German-silver tube *q* protects the lower portions of the rods *o p* from cold. In this lamp the heater for starting the vaporization consists of an annular wick *r*, inclosed in an annular tube *G*, communicating at the top with a small lateral wick *t*, arranged under the plate *k*. A tube *H*, closed at the bottom, protects at a distance the annular tube *G*. A small wick *x*, arranged in the center of the annular wick *y*, terminates under the plate *k*, and the kindling takes place at its top. In a short time the wick *t* kindles and its flame striking the plate *k* is deflected onto the chambers *c*, the tubes *l*, and the chamber *m*, in which the liquid is vaporized.

It is to be observed that in these lamps the height of the liquid hydrocarbon in the lamp-body produces a pressure which aids the capillary action in causing the ascent of the liquid in the wick or wicks. As the lamp-body is wide, the level of the liquid is not for some time sensibly lowered.

The lamp shown in Figs. 4, 5, and 6 is arranged like the former; but it has besides a tube *I*, having a wick in its lower part. This tube *I*, which has a lateral hole *g* for admission of air, opens at its top at the base of the mantle *M*. The kindling-plate *k* at the top of the tube *F* is connected by a metal plate *j* to the tube *I* at the level of the top of its wick. When the wick *I* is lighted, the heat of the plate *k* is transmitted to the tube *I* and a little vapor ascends in this tube along with air which enters at *g* to form a combustible mixture, which may be ignited at the top of the tube *I*, so as to incandesce a small part of the surface of the mantle *M*. Thus light is produced sufficient to see by while waiting for the vaporization necessary for incandescence of all the mantle by the Bunsen burner. On the side is arranged a cylinder *J*, in which works a metal piston *f*, provided with a spring *u* and connected to a rod which is bent back, so that the piston can be moved from outside by acting on a small knob. From the cylinder *J* a tube *v* extends to open above the kindling-wick. The piston-rod has a notch *y*, into

which when the piston is up enters a pawl *c'*, urged by a spring *r'*. Behind the pawl *c'* passes a rod *z*, of metal which is a bad conductor, which has at *a'* a sloped notch. When the rod *D* becomes heated by the incandescence of the mantle, and therefore expands, it raises the rod *z*, which being a bad conductor expands less, and the sloped notch *a'* of this rod acts on the back of the pawl *c'*, disengaging it from the notch at *y* in the piston-rod. The piston being no longer held is rapidly urged down by the spring *r'* and sends wind by the tube *v* to blow out the flame of the heater.

The lamp shown in Figs. 7 to 11 has four wick-tubes *A*, and the vaporizing-chambers and tubes *c*, *l*, and *m* are heated by flames from small tubes *b'*, which open in the upper closed chamber of the heating-wick *F*. At the top of this tube is arranged the plate *k*, which is heated by placing in the capsule *e'* a small piece of solidified alcohol. This lamp comprises, as usual, a tube *I*, which leads a little vapor mixed with air to the base of the mantle to cause the commencement of the incandescence while the vaporization is beginning.

The blowing-cylinder *J* is arranged at the side, with its spring-piston, which is held back by the catch *e'*, connected to the rod *z* of badly-conducting metal. When the mantle has become intensely incandescent, the expansion of the rod *D*, which carries the mantle, raises the rod *z*, the piston *f* is released, and the wind sent by it is directed partly by the tube *v* to the capsule which contains the burning solidified alcohol and partly by the tube *f'* or against the flames issuing from tubes *b'*.

Electricity can be employed to effect the various kindlings. For this purpose there are arranged in the base and pedestal of the lamp a dry or other cell *K*, a condenser *N*, and induction-coil *L*. The circuit is closed by pressing a switch-knob *O*, and the current passes to the commutator *F*, having three knobs (numbered 1 2 3) by which the current can be sent in three different directions—that is to say, when the commutator-arm is on 1 the current produced on pressing the knob *O* causes a spark between the conductor 4 and the solidified alcohol, lighting it. When the commutator-arm is on 2, a fresh push of the knob *O* causes a spark from the conductor 5 in front of the tubes *b'*, kindling the vapor produced in the tubes and the flame heats the vaporizing-chamber. The arm being on 3 a spark is produced between the conductor 6 and the top of the tube *I*.

The heating apparatus shown in Fig. 12 is arranged and acts as above described, so that fresh description of its arrangements is unnecessary. It need only be observed that the vapor issuing by the hole *a* above the vaporizing-chamber burns in the air without passing through a Bunsen tube to burn under a refractory mantle.

Lighting might be effected electrically at a distance of a great number of lamps or burners. In this case the electric generators would be independent of the lamps or by the switch and commutator would be accessible to the person who has to kindle by three successive actions.

Having thus described the nature of this invention and the best means I know of carrying the same into practical effect, I claim—

1. In an incandescent lamp of great intensity burning vapor of liquid hydrocarbon, the combination of a group of casings each containing a squeezed wick in a tube of German silver so as to form a cellular lamp, vaporizing-chambers at the upper ends of each one of these different wick-tubes, a single chamber provided with the gas-outlet nozzle, and conduits connecting said vaporizing-chambers with said single chamber.

2. In an incandescent lamp burning vapor of liquid hydrocarbon, the combination of a Bunsen tube, a second tube adjacent thereto and containing a small wick in its lower part, with a lateral air-hole and an opening at the top at the base of the refractory mantle, and

means for communicating heat at starting to this vertical tube, and producing a little vapor which is lighted at the top so as to cause the commencement of incandescence of the mantle. 30

3. In an incandescent lamp burning vapor of liquid hydrocarbon, the combination of means for making a starting-flame, and means for automatically extinguishing the same after the lamp is started. 35

4. In an incandescent lamp burning vapor of liquid hydrocarbon, the combination of means for making a starting-flame and a blower adapted to automatically extinguish the starting-flame, consisting of a cylinder, a piston therein, a catch holding said piston retracted against the pressure of said spring, and means operated by the heat of the mantle for releasing said catch. 40

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses. 45

LOUIS DENAYROUZE.

Witnesses:

MARCEL ARMENGAUD, Jeune,
EDWARD P. MACLEAN.