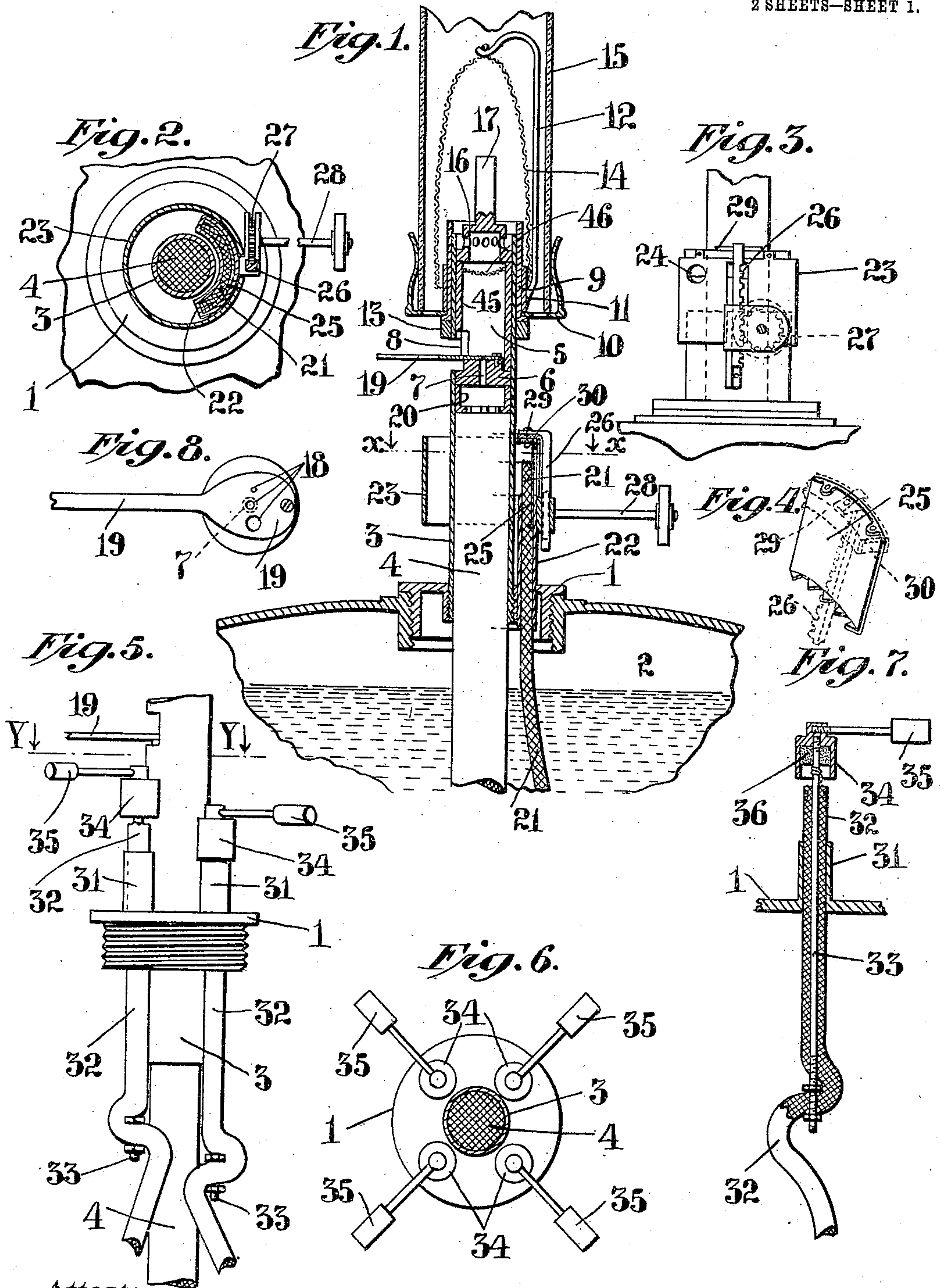


W. E. GARD.
LAMP BURNER.
APPLICATION FILED APR. 9, 1908.

938,754.

Patented Nov. 2, 1909.
2 SHEETS—SHEET 1.



Attest:
Paul H. Frank

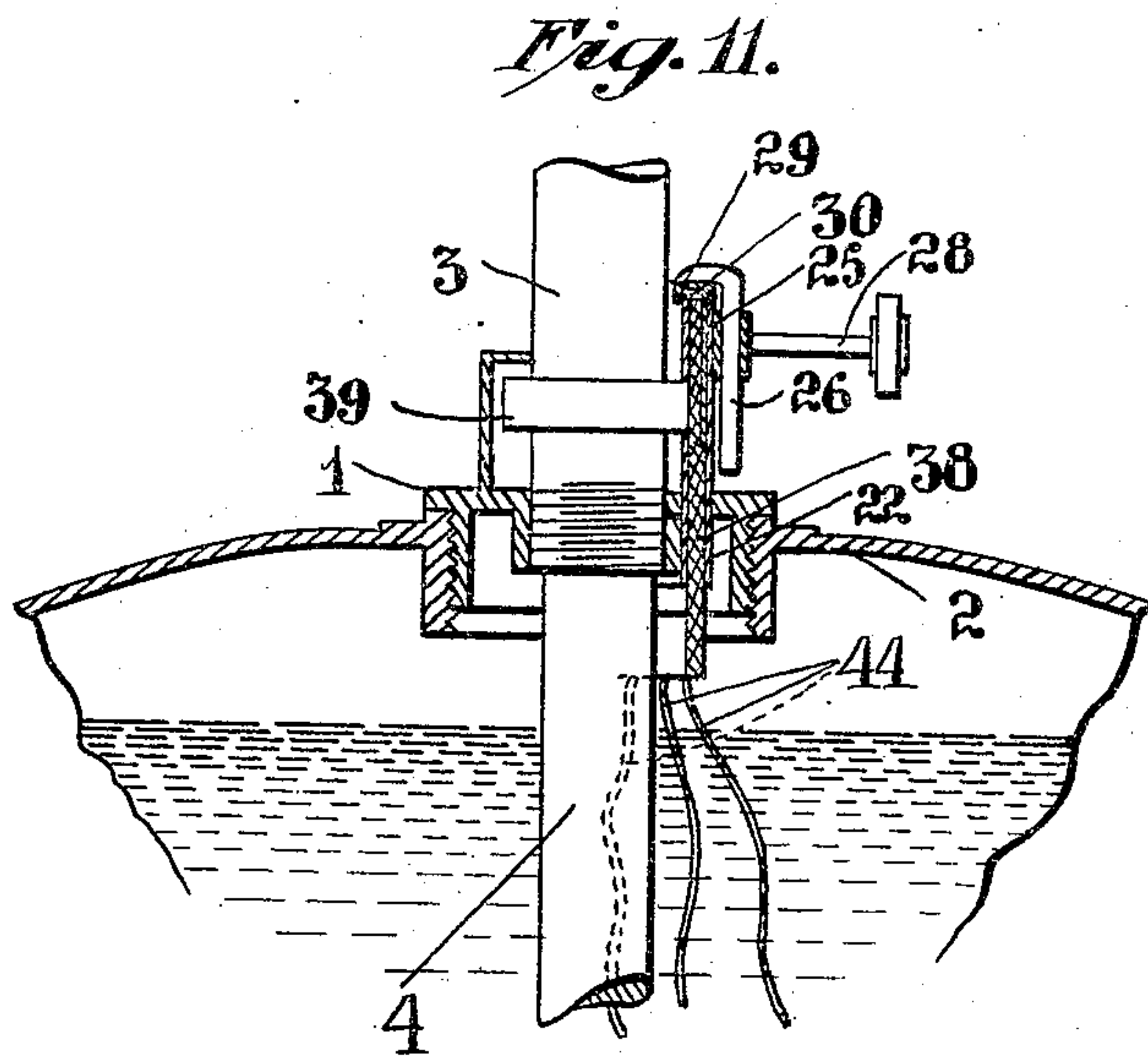
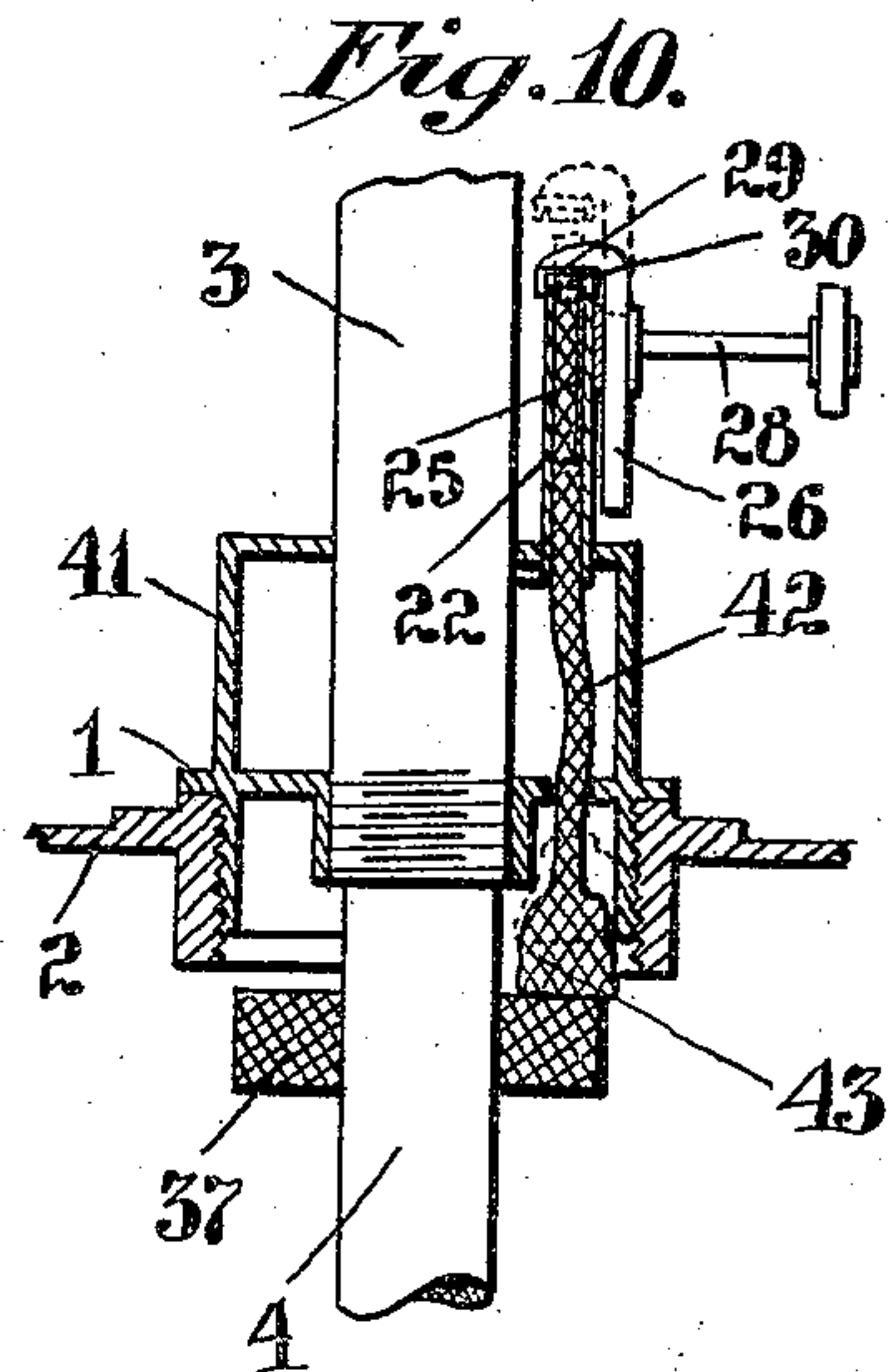
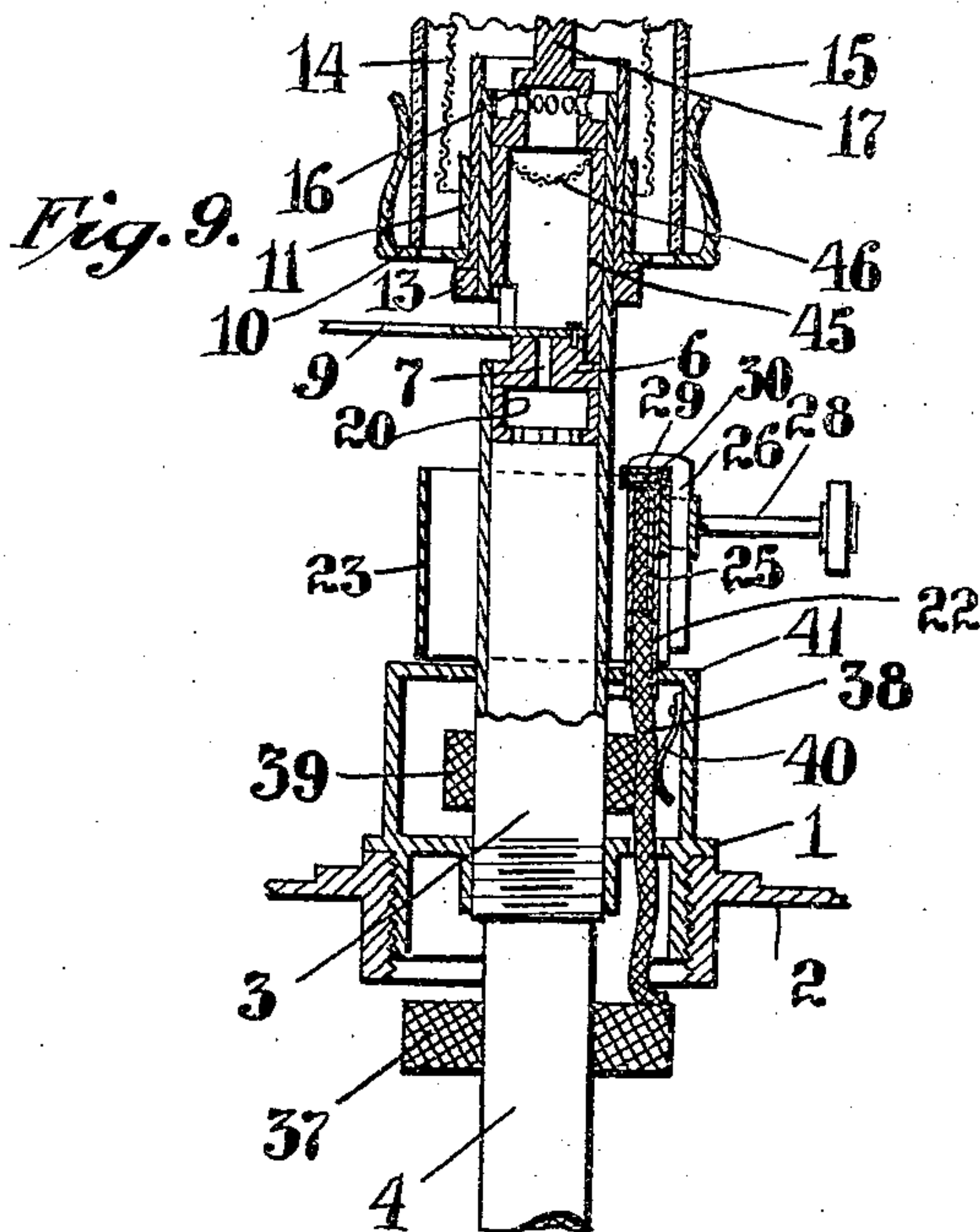
Inventor:
William E. Gard
by *Marble D. Mott*
Attys

W. E. GARD.
LAMP BURNER.
APPLICATION FILED APR. 9, 1908.

938,754.

Patented Nov. 2, 1909.

2 SHEETS—SHEET 2.



Attest:
Ed. Mitchell
Paul H. Frank

by

Inventor:
William E. Gard
Marion Maetz
Attys

UNITED STATES PATENT OFFICE.

WILLIAM E. GARD, OF SOUTH ORANGE, NEW JERSEY.

LAMP-BURNER.

938,754.

Specification of Letters Patent.

Patented Nov. 2, 1909.

Application filed April 9, 1908. Serial No. 426,107.

To all whom it may concern:

Be it known that I, WILLIAM E. GARD, a citizen of the United States, and a resident of South Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Lamp-Burners, of which the following is a specification.

My invention relates to burners adapted for the use of volatilizable fuels, such as various hydrocarbons, and particularly to burners adapted for the use of alcohol and particularly denatured alcohol. It is intended that the fuel shall be burned with a colorless or substantially colorless flame, which may be used to heat an incandescing mantle, to heat an air chamber, (as in so-called "lamp stoves"), and for various other purposes.

The lamp herein described embodies certain features illustrated, described and claimed in my application filed March 6, 1908, Sr. No. 419,522.

My invention comprises improved means for heating the burner initially; improved means for regulating the flame; means for regulating the duration of the initial heating flame; and various other features, hereinafter mentioned and particularly pointed out in the appended claims.

The objects of my invention are, to improve the initial heating devices of burners of the kind referred to, to avoid the use of charging devices separate from the burner itself, to avoid evaporation of fuel from the initial heating device, to extinguish the flame of the initial heating device positively, to avoid the action of external air drafts on the flame of the initial heating device, to regulate the main flame of the lamp, to cause the auxiliary heating flame to be extinguished automatically, and generally to make the burner compact, simple, easily operated, safe, and not liable to derangement.

I will now proceed to describe my invention with reference to the accompanying drawings, in which certain forms of burners embodying my invention are illustrated, and will then point out the novel features in claims.

In said drawings: Figure 1 shows a central vertical section of one form of my said

burner, and of a part of a fuel reservoir therefor. Fig. 2 shows a transverse section of the burner on the line X—X of Fig. 1. Fig. 3 shows a detail side elevation of the initial heating device. Fig. 4 shows a perspective view of the wick-gripping device, and indicates in dotted lines the arrangement of the rack-bar and extinguishing cap with respect thereto. Fig. 5 shows a side elevation of a portion of another burner, having an alternative form of initial heating device. Fig. 6 shows a horizontal section of this second burner on the line Y—Y of Fig. 5. Fig. 7 shows a central vertical section through one of the auxiliary wick tubes of this second form of burner. Fig. 8 shows a detail top view of the regulating valve of these burners. Fig. 9 shows a vertical section, similar to Fig. 1, of a third form of burner, comprising means for limiting duration of the initial heating flame; Fig. 10 is a similar view illustrating further alternative means for limiting duration of the initial heating flame; Fig. 11 is another similar view illustrating still further means for the same purpose.

Referring first to Figs. 1 to 4 inclusive and Fig. 8, 1 designates the base of a burner, adapted to screw into an orifice in the top of a fuel reservoir, 2. 3 designates a wick tube within the base 1, and 4 a solid wick within this tube, the end of which wick hangs down into the reservoir 2. 5 is a mixing chamber (mechanically an extension of tube 3, the two parts of said tube being separated by a disk 6 having in it a valve port 7). In the side of this mixing chamber is an air opening, 8. About the upper part of this tube 5 there is a sleeve 9, flanged at the lower end, as shown, to support a chimney gallery 10 and the ferrule 11 of a mantle-support, 12. This sleeve 9 rests on a shoulder 13 of tube 5, and is adapted to be lifted off of said tube, together with the chimney gallery and with a mantle 14 and draft chimney 15. Within tube 5 there is a flame-spreader 16, perforated at the sides as shown, near the top of tube 5, and preferably provided with a projection 17, extending up into the mantle, and serving to conduct heat downward from the main flame to the tube 5. In this burner, the alcohol or other liquid fuel carried by the wick 4 is vaporized at or

near the top of the wick 4 by the heat of the flame above tube 5, such heat being conducted downward to the vicinity of the wick by the metal parts of the burner; and the fuel so vaporized issues through valve port 7 in disk 6 and through one of a series of ports 18, of graduated size, in a valve 19 directly above disk 6, and, passing upward through the tube 5, mixes with air entering through opening 8 in the side of the tube, ignites after passing through openings in flame-spreader 16, and burns, the flame being spread out so as to heat the mantle 14 effectively. It is desirable to provide for the conduction downward of a considerable proportion of the heat generated by this main flame, and to that end the spreader and tubes 5 and 3 are made of material of high heat conductivity and are made of considerable section; also the projection 17 aids materially in conducting downward the desired amount of heat. I preferably provide in tube 3, between the top of wick 4 and the partition 6, a gas space; and to this end I preferably provide between the top of said wick 4 and partition 6 a foraminous spacing collar 20; the gas space so formed giving ample opportunity for the disengagement of the gas from the wick 4 and for its passage to port 7.

It is necessary to heat the tubes 5 and 3 initially, to start the burner in operation, and to this end in my prior application above referred to I have illustrated a ring of absorbent material surrounding the wick tube 3, and means for conveying to said absorbent material a charge of liquid fuel. It is desirable to avoid the use of anything not mechanically a part of the burner for starting it in operation, and hence according to the present invention I provide one or more auxiliary wicks, supplied more or less directly with fuel from the main reservoir of the lamp. In Fig. 1 I have shown one such auxiliary wick, 21, mounted in a wick tube 22 at the side of tube 3, the upper end of said wick so positioned that the flame from it will be in close proximity to tube 3. I also provide, preferably, a wind shield, 23, to prevent external air drafts from affecting the heating of tube 3 by this auxiliary flame, said wind shield in the instance shown extending entirely around tube 3, though this is not necessary in all cases; and in order to light the auxiliary flame, I have shown this wind shield provided with an opening 24 through which the end of a lighted match or the like may be inserted. To raise and lower the auxiliary wick I have shown a wick-gripping plate 25, (Fig. 4) arranged to slide up and down in tube 22 and provided with a rack bar 26 outside said tube and engaged by pinion 27 on a wick-raising shaft 28. It will be obvious that by rotating this shaft 28 in one direction or the other, the

auxiliary wick may be raised or lowered somewhat. To extinguish the auxiliary flame when desired, and also to reduce or prevent evaporation of fuel at the top of the auxiliary wick, after the lamp is in operation, I provide this wick-gripping plate 25 with a cap 29 adapted to fit well over the top of auxiliary wick-tube 22 and preferably provided with a layer of packing material 30, such as asbestos for example. It will be obvious that when the top of the auxiliary wick is raised slightly above the top of wick tube 22 and a light applied thereto, the flame from this auxiliary wick will heat tubes 3 and 5; and that when this wick 21 is lowered and cap 29 covers tube 22, the auxiliary flame will be extinguished and evaporation from the auxiliary wick substantially prevented. The auxiliary wick may extend a greater or less extent around tube 3 as desired; or I may provide a plurality of such tubes. This is illustrated in Fig. 5, in which 31, 31 designate such auxiliary wick tubes, and 32, 32 round wicks therein, strung upon stiffening rods 33, which rods are provided, above the tops of the wicks, with extinguishing caps 34 and handles 35. In this construction, the auxiliary wicks are raised or lowered by raising or lowering said handles directly. The caps are provided with packing material, 36.

In the burners shown in Figs. 1 and 5 it is intended that after the main flame is burning well the auxiliary flame or flames shall be extinguished by lowering the auxiliary wick or wicks. It is conceivably desirable, however, to provide means whereby this auxiliary flame shall be extinguished automatically after a time, so that possible neglect or inattention of the user shall not cause too great heating of the main wick tube. To this end, in the construction shown in Fig. 9, showing an auxiliary wick and operating means therefor arranged as shown in Fig. 1, I provide around main wick 4, and within fuel reservoir 2, a ring 37 of absorbent material against which the lower end of the auxiliary wick, here numbered 38, will rest when said wick is in its lowermost position, but from which it will be raised when said wick is raised to light it. Above the base 1 of the burner, and surrounding the wick tube 3, there is a ring 39 of absorbent material against which the auxiliary wick 38 will rest. To insure contact between the auxiliary wick and the absorbent ring 39, I may provide a light spring 40 tending to press wick 38 against ring 39. The intention is that wick 38 and ring 39 shall have in themselves sufficient storage capacity for fuel so that when wick 38 no longer contacts with absorbent material 37 and so can no longer draw fuel therefrom, there will still be fuel enough in wick 38 and ring 39 to maintain the auxiliary flame long enough to

heat up the burner until it is in full operation. The auxiliary flame may of course be extinguished at any time by turning down wick 38 by means of shaft 28; but if said wick is not turned down the auxiliary flame will nevertheless go out of itself when the fuel in it and in ring 38 is substantially exhausted. The wick 38, or at least the upper part thereof, will commonly be made of asbestos or asbestic material, so as not to require constant trimming. It will be seen that when wick 38 is in contact with ring 37 it draws fuel from said ring (which in turn is supplied with fuel from the wick 4) and said wick 38 being in contact with absorbent ring 39, keeps the latter moist with fuel. To reduce evaporation from the wick 38 and ring 39 I preferably provide an inclosure 41 fitting somewhat closely to the wick tube 3 and to which the auxiliary wick tube 22 is connected.

In the construction shown in Fig. 10, instead of employing a ring of absorbent material 39, as in Fig. 9, the lower portion of the auxiliary wick, here numbered 42, is provided with a considerable mass of absorbent material 43 (which may be integral with the material of the wick) arranged to rest upon ring 37 when said wick 42 is in its lowermost position, and to be raised from said ring 37 when the wick 42 is raised to start the auxiliary flame. This arrangement is an obvious equivalent of what is shown in Fig. 9.

In the construction shown in Fig. 11 the auxiliary wick 38 does not itself extend into the fuel in reservoir 2, but is provided with one or more small wicks 44 of too small capacity to in themselves support any appreciable flame at the top of the wick 38. When there is no flame at wick 38 these wicks 44 will saturate wick 38 (and the ring 39, if such ring be used) and when wick 38 is lighted the fuel stored in said wick and in ring 39 (if the latter be used) will burn out and then the auxiliary flame will be extinguished or will die down until it is negligible, the wicks 44 being, as stated, too small to support any appreciable flame.

Referring again to Fig. 1, I have shown the flame spreader 16 as supported within mixing chamber 5 upon a sleeve 45 fitting closely within tube 5 and resting upon partition 6, and provided near its upper end with a foraminous diaphragm 46 which serves to distribute the draft current evenly and to prevent back-rush of flame and consequent ignition of the gas at valve 19. As previously explained, in lamps of this sort it is important to provide for considerable conduction of heat downward, and it is largely for this reason that this sleeve 45 is provided, said sleeve being of considerable thickness and being in direct contact (and it may be integral with) the spreader 16 which,

and particularly the upward extension 17 thereof, will be highly heated by the flame.

The operation of any of the forms of burners herein shown is substantially the same, and is as follows: To start the lamp in operation the auxiliary wick or wicks is or are raised and lighted, the chimney gallery with the mantle and draft chimney thereon being first removed, preferably, though this is not necessary. The valve 19 is moved to a position such that one of its ports is in registry with port 7. As the tubes 5 and 3 become heated the alcohol in wick 4 is vaporized and said vapor, passing upward through port 7 into the mixing chamber and mixing there with air, passes out through the perforations in the flame spreader 16, and is ignited by the auxiliary flame and burns. As soon as this main flame is burning substantially normally, the auxiliary flame is extinguished either by turning down the auxiliary wick, or automatically, as previously explained. The chimney gallery is then replaced. The main flame may be regulated as desired, by turning the valve slightly so as to throttle the flow of gas through one of its ports, or by turning such valve so as to bring another of its ports into registry with port 7. The main flame may be extinguished altogether by moving the valve so as to cut off the supply of gas, the burner then cooling down.

The construction of burner shown comprising a single central of gas supply port 7 and an annular support for the spreader 16, has the important advantage that the flame is distributed substantially uniformly to all portions of the mantle.

What I claim is:—

1. A burner for liquid fuel comprising in combination a burner base, a wick tube adapted to hold a main wick, a mixing chamber adapted to receive fuel vapor therefrom and provided with means for the introduction of air and with an opening at a point beyond where the air is introduced, auxiliary wick-holding means in effective heating proximity to such tube and mixing chamber arranged to hold an auxiliary wick adapted to project downward below the burner base, and means for raising and lowering said auxiliary wick comprising sealing means adapted to prevent escape of vapor from said auxiliary wick when lowered.

2. A burner for liquid fuel comprising in combination a burner base, a wick tube adapted to hold a main wick, a mixing chamber adapted to receive fuel vapor therefrom and provided with means for the introduction of air and with an opening at a point beyond where the air is introduced, an auxiliary wick in effective heating proximity to said tube and chamber, adapted to depend downward below the burner base, and means for raising and lowering said auxiliary wick,

comprising sealing means adapted to prevent escape of vapor from said auxiliary wick when lowered.

3. A burner for liquid fuel comprising in combination a burner base, a wick tube adapted to hold a main wick, a mixing chamber adapted to receive fuel vapor therefrom and provided with means for the introduction of air and with an opening at a point beyond where the air is introduced, auxiliary wick-holding means in effective heating proximity to such tube and mixing chamber arranged to hold an auxiliary wick adapted to project downward below the burner base and means for raising and lowering said auxiliary wick comprising extinguishing means for said auxiliary wick.

4. A burner for liquid fuel comprising in combination a main wick tube, a mixing chamber adapted to receive fuel vapor therefrom and provided with means for the introduction of air and with an opening at a point beyond where the air is introduced, an auxiliary wick tube in effective heating proximity to said main wick tube and mixing chamber, adapted to contain a wick to support an auxiliary flame for heating the burner initially, and means for raising and lowering such auxiliary wick comprising an extinguishing cap adapted to close the top of such auxiliary wick tube.

5. A burner for liquid fuel comprising in combination a main wick tube, a mixing chamber adapted to receive fuel vapor therefrom and provided with means for the introduction of air and with an opening at a point beyond where the air is introduced, an auxiliary wick tube in effective heating proximity to said main wick tube and mixing chamber, adapted to contain a wick to support an auxiliary flame and heating the burner initially, and means for raising and lowering such auxiliary wick comprising an extinguishing cap adapted to close the top of such auxiliary wick tube and provided with packing material.

6. A burner for liquid fuel comprising in combination a burner base, a wick tube adapted to hold a main wick, a mixing chamber adapted to receive fuel vapor therefrom and provided with means for the introduction of air and with an opening at a point beyond where the air is introduced, and means for holding in proximity to such tube and mixing chamber an auxiliary wick adapted to project downward below the burner base, and a flame guard surrounding said wick tube and auxiliary-wick holding means and arranged to protect the flame from said auxiliary wick, said guard open at the top and bottom.

7. A burner for liquid fuel comprising in combination a burner base, a wick tube adapted to hold a main wick, a mixing chamber adapted to receive fuel vapor

therefrom and provided with means for the introduction of air and with means adapted to limit combustion to a point beyond where the air is introduced, means for holding in proximity to such tube and mixing chamber an auxiliary wick adapted to project downward below the burner base, and means for supplying to such auxiliary wick fuel only sufficient to maintain a flame therefrom for a limited period.

8. A burner for liquid fuel comprising in combination a wick tube adapted to hold a main wick, a mixing chamber adapted to receive fuel vapor therefrom and provided with means for the introduction of air and with means adapted to limit combustion to a point beyond where the air is introduced, a main wick in said wick tube, means for holding in proximity to such tube and mixing chamber an auxiliary wick adapted to project downward below the burner base, and absorbent material connected to said main wick and with which such auxiliary wick will contact when lowered.

9. A burner for liquid fuel comprising in combination a wick tube adapted to hold a main wick, a mixing chamber adapted to receive fuel vapor therefrom and provided with means for the introduction of air and with means adapted to limit combustion to a point beyond where the air is introduced, a main wick in said wick tube, means for holding in proximity to such tube and mixing chamber an auxiliary wick adapted to project downward below the burner base, absorbent material connected to said main wick and with which such auxiliary wick will contact when lowered, and another body of absorbent material adapted for storage of fuel and with which such auxiliary wick will make contact.

10. A burner for liquid fuel comprising in combination a one-piece tube having, at an intermediate point, a transverse ported partition dividing said tube into two chambers, one a wick chamber and the other a mixing chamber, said tube having above said partition an opening for the admission of air to said mixing chamber, an annular flame spreader perforated for the escape of air and gas at a point below the top of such mixing chamber, and a sleeve fitting within said mixing chamber and located close to the side thereof and resting on said partition, and forming a support for said flame spreader.

11. A burner for liquid fuel comprising in combination a one-piece tube having, at an intermediate point, a transverse ported partition dividing said tube into two chambers, one a wick chamber and the other a mixing chamber, said tube having above said partition an opening for the admission of air to said mixing chamber, an annular flame spreader perforated for the escape of

air and gas at a point below the top of such
mixing chamber, and a sleeve fitting within
said mixing chamber and resting on said
partition, and forming a support for said
5 flame spreader, said sleeve having a fo-
raminous diaphragm forming a guard to
prevent back rush of flame.

In testimony whereof, I have signed this
specification in the presence of two witnesses.

WILLIAM E. GARD.

Witnesses:

H. M. MARBLE,

FRANK E. RAFFMAN.