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Patented July 24, 1900.

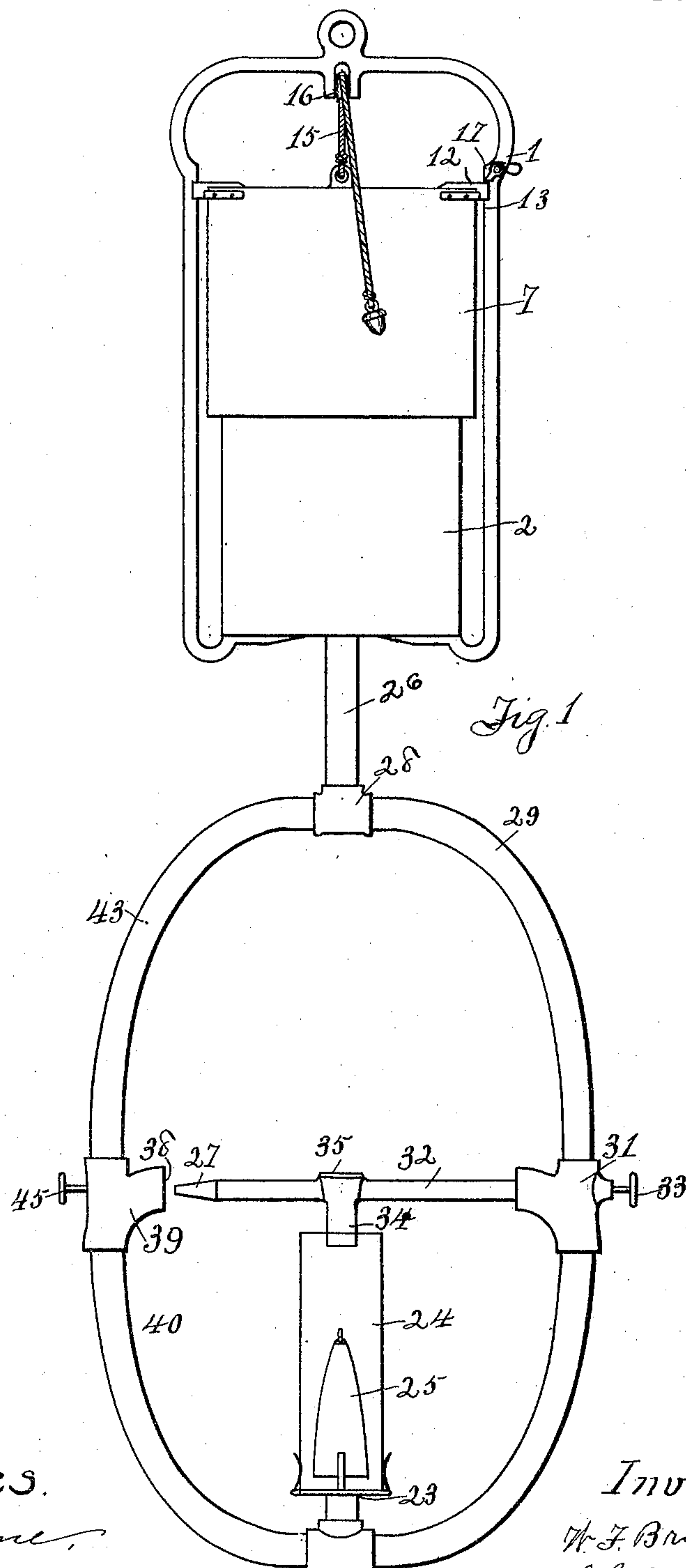
W. F. BRADBURY & L. G. SMITH.

VAPOR BURNING LAMP.

(Application filed Nov. 3, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses.
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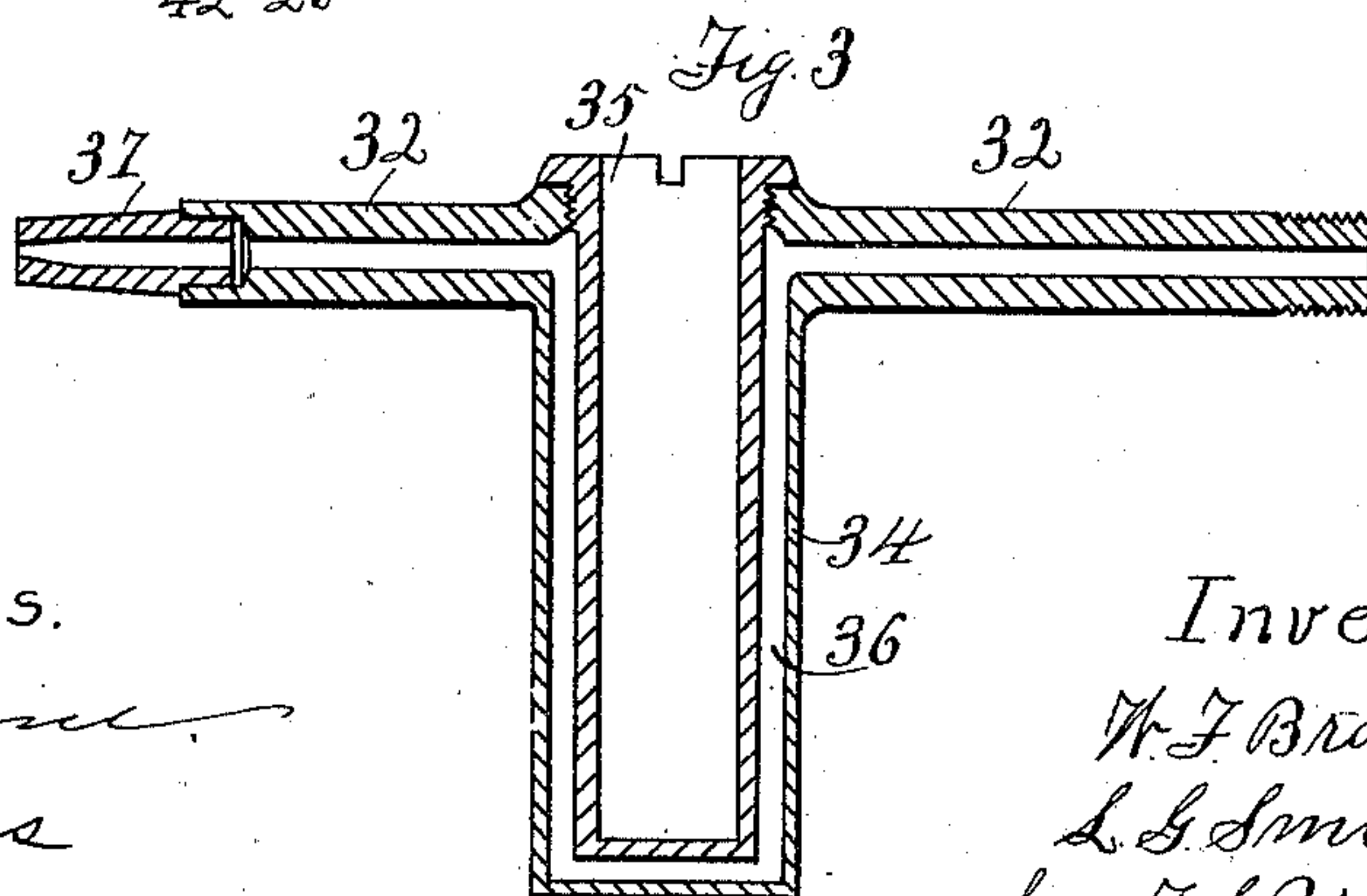
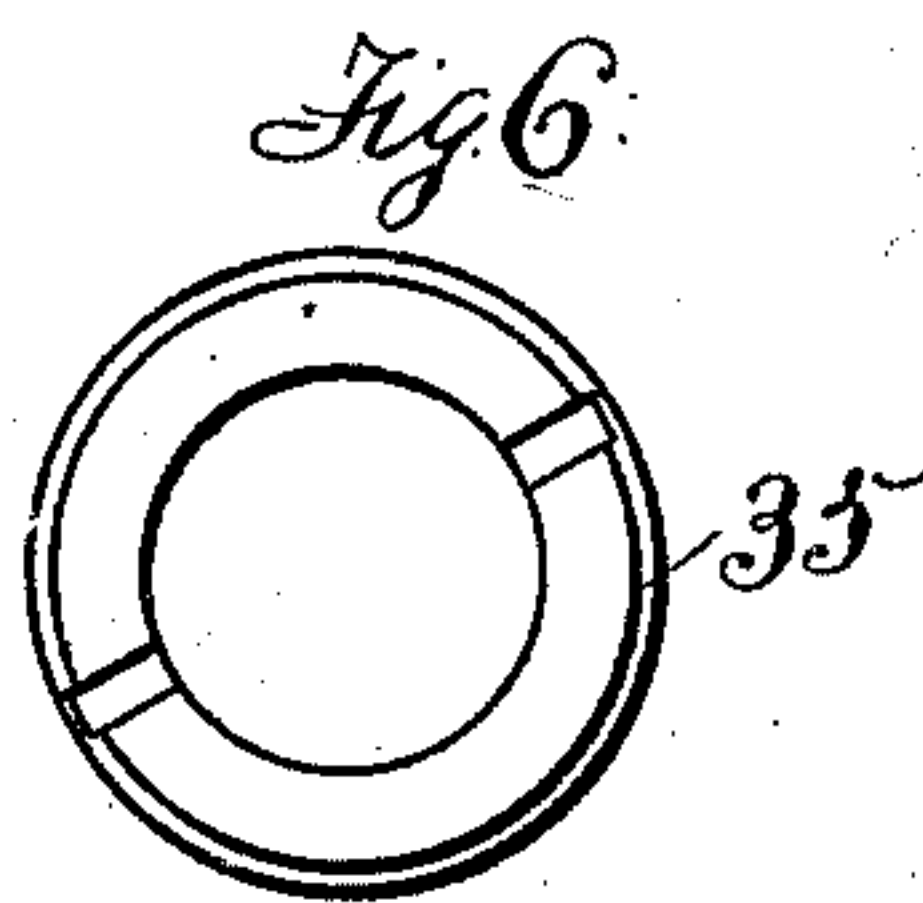
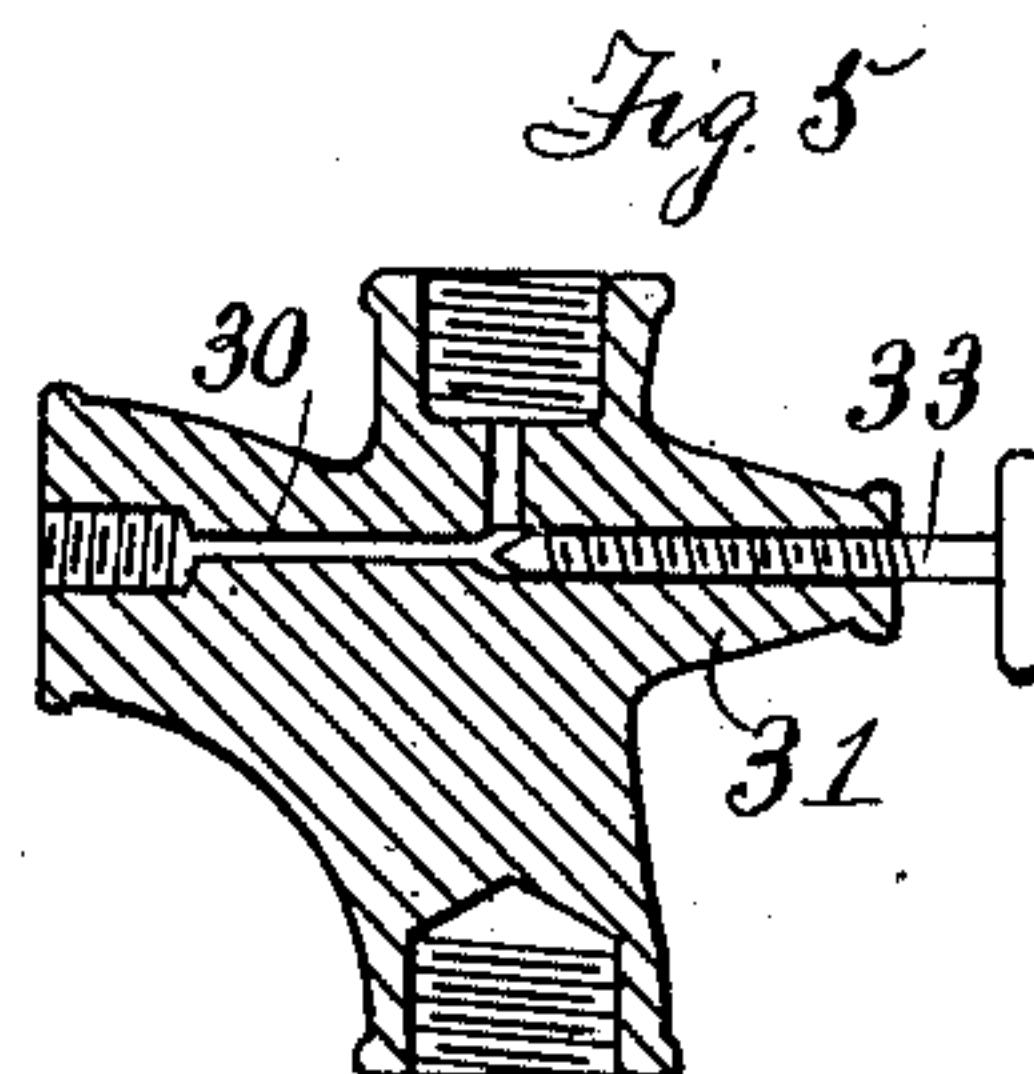
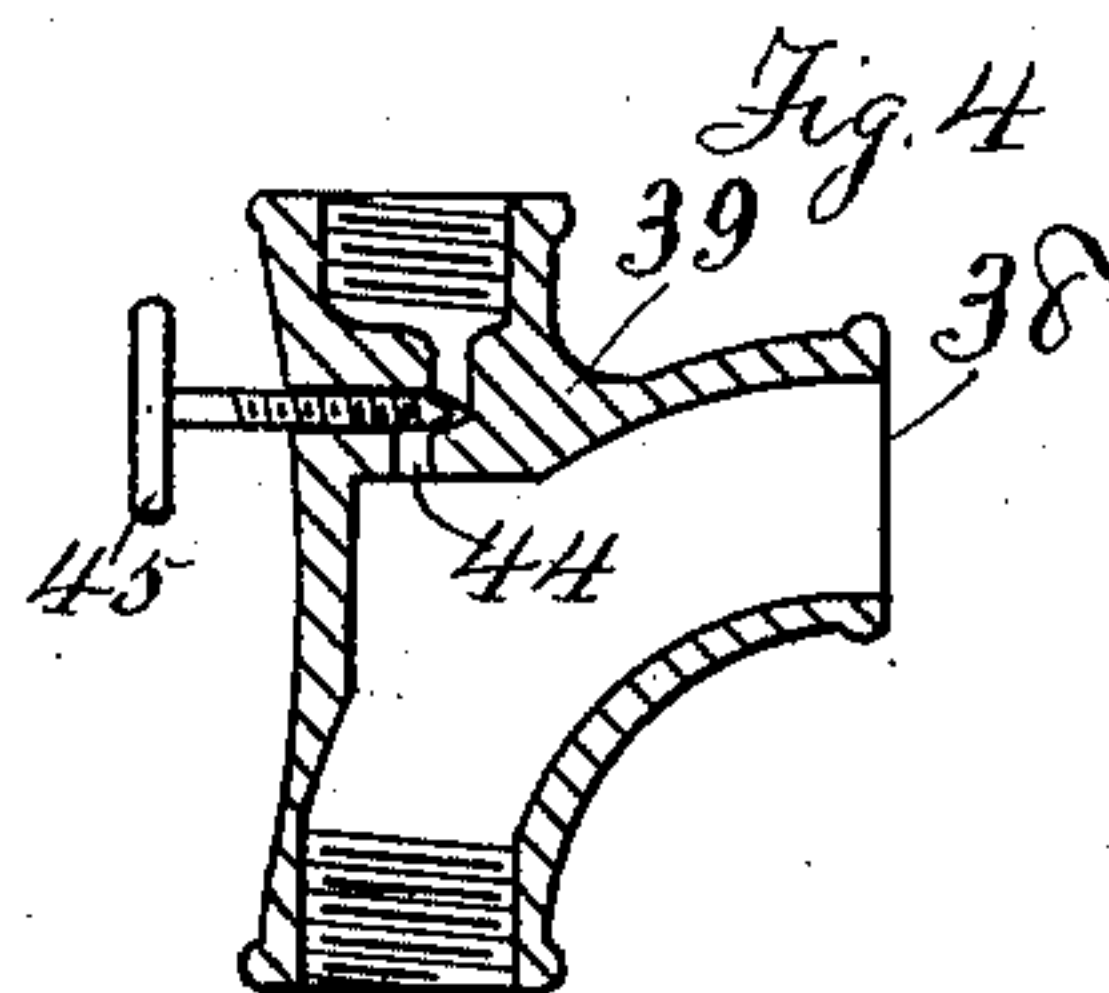
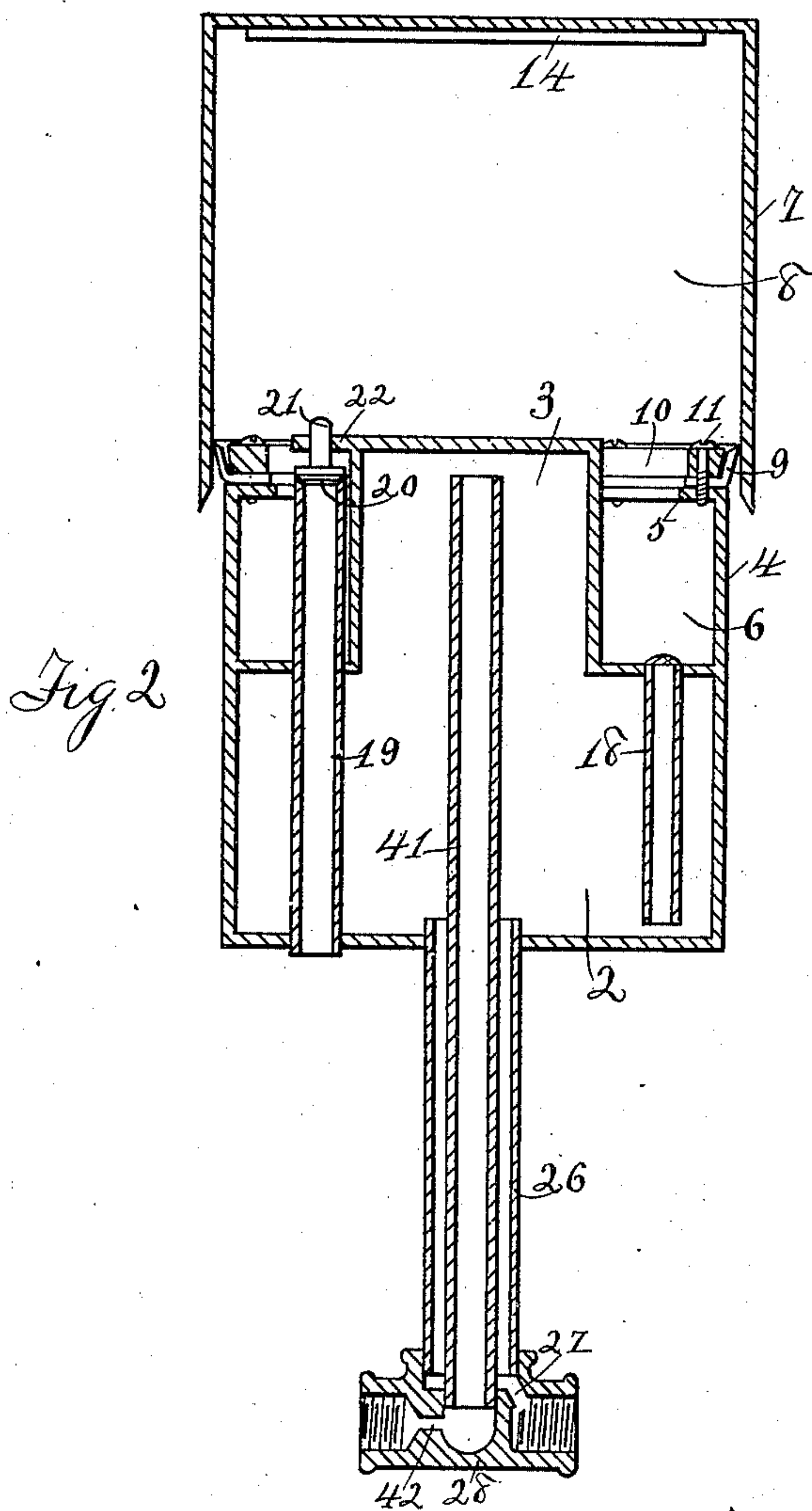
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UNITED STATES PATENT OFFICE.

WILLIAM F. BRADBURY AND LEVI G. SMITH, OF KANSAS CITY, KANSAS.

VAPOR-BURNING LAMP.

SPECIFICATION forming part of Letters Patent No. 654,380, dated July 24, 1900.

Application filed November 3, 1899. Serial No. 735,696. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM F. BRADBURY and LEVI G. SMITH, whose residence and post-office address is Kansas City, in the
5 county of Wyandotte, in the State of Kansas, citizens of the United States, have invented certain new and useful Improvements in Vapor-Burning Lamps, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

Our invention relates to improvements in vapor-burning lamps of that class in which
15 a liquid hydrocarbon, usually gasolene, is vaporized from the heat of the burner and the vapor mixed with a suitable amount of air and carried to the burner and there ignited and burned in the presence of a surrounding incandescent mantle; and our invention consists in certain features of novelty hereinafter described, and pointed out in the claims.

Figure 1 represents an elevation of a lamp complete embodying our invention. Fig. 2
25 represents a vertical section of the oil-reservoir and air-chamber. Fig. 3 represents a vertical section of the generator or vaporizer. Fig. 4 represents a cross-section of the union by which the vapor-tube from the reservoir is connected with the air-mixing tube. Fig. 5
30 represents a cross-section of the union connecting the supply-pipe with the vaporizer. Fig. 6 represents a plan view of the top of the vaporizer-thimble.

Similar numerals refer to similar parts
35 throughout the several views.

1 represents a hanging-bracket by which the lamp and its parts are supported or suspended.

2 represents a liquid-reservoir or supply-tank carried on said bracket. As shown in
40 Fig. 2, said reservoir, over its central portion, is constructed and provided with a vapor-storage chamber 3, and its sides are extended upward, forming a casing 4, having an in-
45 turned rim 5 and providing an air-cup 6, surrounding the vapor-storage chamber 3.

7 represents a casing forming an air-chamber 8 of larger diameter than the casing 4 and reservoir and arranged to move vertically over
50 the same.

9 represents a packing-ring fitting closely against the inner face of the casing 7 under

pressure of the air within the air-chamber, whereby said air-chamber is sealed against the escape of air therefrom. Said packing-
55 ring is secured upon the rim 5 by the ring 10 and screws 11 passing therethrough and engaging the rim. At the top of said casing 7 are provided lugs 12, formed and arranged to engage and travel vertically upon guides
60 13, formed on the bracket 1, as the casing moves up and down over the reservoir.

14 represents a weight added to the weight of the casing to assist in its downward move-
65 ment.

15 represents a cord secured to the top of the casing and passing over the pulley 16, whereby the casing is raised or drawn up, and
70 17 represents a stop pivoted on the bracket to prevent the casing being drawn up so far that the lugs will escape from the guides, but which may be turned aside to permit disengagement of the lugs when it is desired to remove the casing.

18 represents an air-tube communicating
75 with the bottom of the air-cup 6 and extending to near the bottom of the reservoir.

19 represents an air-tube for supplying air to the air-chamber. 20 represents a valve having its seat upon the end of said air-tube
80 and provided with a stem 21, engaging a perforated lug 22, mounted on the casing of the vapor-storage chamber, said valve being retained upon its seat by pressure of the air in the air-chamber.

A lamp-fixture of any desired form, formed of tubing, supports a burner 23, provided with a chimney 24 and incandescent mantle
85 25 in the usual manner.

26 represents a supply-pipe, which also
90 serves to support the fixture. Said pipe communicates with the reservoir at or near its bottom and through the passage 27 in the union 28 with the supply-tube 29 of the fixture, said tube 29 in turn communicating
95 through the passage 30 in the union 31 with the vaporizing-tube 32, a valve 33 being provided to regulate the supply of liquid admitted to the vaporizer. Said vaporizing-tube is arranged to be heated over the chimney
100 and is formed with a cell 34 immediately over and extending a short distance within the chimney. Said cell is formed with very thin walls and is open at the top to receive a thim-

ble 35, closed at its inner end and secured therein and extending nearly to the bottom, and whereby a thin chamber 36 is formed within the cell surrounding the thimble. By this construction and arrangement of the vaporizer is obtained a large heating and vaporizing surface with very thin walls without increasing the size of the passage beyond an effective limit. It will also be noted that by reason of the thin walls of the cell it may be very quickly heated at the bottom sufficiently to vaporize the liquid preparatory to lighting the lamp, and as the bottom and sides become more intensely heated and the tube sufficiently so to vaporize the liquid the vapor will not be forced to the bottom of the cell before it can reach an outlet, but will simply pass around the upper part of the thimble to the outlet, and thus is avoided a very serious difficulty and objection met with in the usual construction, in which two concentric tubes are employed in the vaporizer. In such construction either the inner or outer tube communicates with the source of supply and the other with the outlet for the vapor, so that the liquid, or after the concentric tubes and horizontal portion of the vaporizer become sufficiently heated the vapor, must pass clear to the bottom of one of the concentric tubes before it can enter the other to pass to the outlet, and in so doing will come in contact with the intensely-heated surface at the bottom and on the sides near the bottom, and by such contact the carbon particles of the vapor will become charred and will stop up the outlet, in either case seriously impairing the usefulness of the lamp. To overcome and remove this difficulty in the manner above set out constitutes a leading feature of the present invention.

An injector 37, having a minute opening, is connected with the vaporizing-tube, from which the vapor issues and enters the air-opening 38 in the union 39, drawing with it the requisite amount of air, and the vapor and air thus entering in passage through the mixing-tube 40 to the burner become thoroughly mixed, and being lighted and an incandescent mantle provided a very brilliant and steady flame is produced.

It is understood that the vaporizer must be heated to the temperature necessary to vaporize the liquid preparatory to lighting the lamp. This is usually done by the use of a torch dampened with alcohol or other volatile liquid or some like contrivance involving time and trouble. To avoid this inconvenience and obtain at once the full benefit of the brilliant light of the lamp, a vapor-pipe 41 is provided extending to within a short distance of the top of the vapor-storage chamber in the reservoir and communicating through the passage 42 in the union 28 with the vapor-tube 43 of the fixture, said vapor-tube communicating through a restricted passage 44 in the union 39 with the mixing-tube

40, the force of the discharge from said passage being sufficient to draw in through the air-opening 38 the requisite amount of air to mix with the vapor and form a gas which when ignited at the burner will at once give a brilliant light as well as heating the vaporizer to the necessary temperature. A valve 45 is provided to close the passage 44 and prevent the escape of vapor from the reservoir when the lamp is not in use. Said passage may, however, be left open when the lamp is in use with very advantageous effect, in that, as is well known, when the vaporizer becomes highly heated great and irregular expansion of the vapor therein will be produced and at times a larger supply than can pass out at the injector, causing in the usual construction a fitful ejection of the vapor and consequent fitfulness and unsteadiness of the flame, while with this construction the surplus of expanded vapor in the vaporizer will pass back to the reservoir and to the vapor-storage chamber therein and thence through the vapor-pipe and its connections to the mixing-chamber, insuring a constant and full supply of vapor in the mixing-chamber and consequent steady flame.

To fill the reservoir, the casing forming the air-chamber is removed by raising it until the lugs are released from the guides and pouring the liquid into the cup 6, whence it will pass through the tube 18 to the reservoir, and it will be noted that if from any cause while operating the lamp the liquid is drawn or passes from the reservoir into the cup 6 it will at once flow or be forced by the air-pressure back into the reservoir.

To light the lamp, the casing forming the air-chamber is drawn up, and the air will flow in through the air-supply tube 19 and fill the air-chamber. Then releasing the casing the weight thereon will cause it to descend, forcing the air therein through the air-tube 18 into the reservoir, where it will pass up through the liquid to the vapor-storage chamber in a highly-carbureted condition, and the vapor and highly-carbureted air will pass thence through the vapor-pipe 41 and vapor-tube 43 to the mixing-chamber, and thence, mixed with an additional amount of air, to the burner, where being ignited it will produce a brilliant light and also heat the vaporizer. The vaporizer being heated the supply of liquid is turned on and is vaporized, the vapor passes to the burner, and the lamp continues to burn so long as there is a supply in the reservoir.

Having thus fully described our improvements, what we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination with a vapor-burner of a bracket provided with suitable guides, an oil-reservoir provided with a vapor-storage chamber carried on said bracket, an air-chamber inverted and arranged to travel on said guides, and adapted to surround said reservoir, a valved air-supply tube for sup-

plying air to said air-chamber, an air-tube communicating with said air-chamber and with the reservoir, a packing-ring secured upon the reservoir-casing and bearing upon said air-chamber casing and forming a seal to said air-chamber, and a vapor-pipe extending into said vapor-storage chamber and communicating with the burner; substantially as set forth.

2. In a vapor-burning lamp the combination with a burner provided with a chimney and an incandescent mantle, and a mixing-tube having an air-supply opening, and communicating with the burner, of an oil-reservoir, a supply-pipe communicating with said reservoir; and a vaporizer arranged over the chimney and communicating with the said supply-pipe and consisting of a vaporizing-tube, a vaporizing-cell formed in said tube over and extending within the chimney, a thimble secured in said cell and forming a thin chamber within said cell surrounding said thimble, and a vapor-injector having a minute opening mounted in said tube in line with the air-opening in said mixing-chamber, and a valve for regulating the supply of liquid to the vaporizer; substantially as set forth.

3. In a vapor-burning lamp, a vaporizer consisting of a vaporizing-tube, a vaporizing-cell formed in said tube, a thimble closed at its inner end secured in said cell and forming a thin chamber within said cell surrounding said thimble, and a vapor-injector having a minute opening connected with said tube, substantially as set forth.

4. In a vapor-burning lamp the combination with a burner provided with a chimney and an incandescent mantle, a mixing-chamber having a suitable air-opening communicating with said burner and a vaporizer arranged to be heated from the burner and having a minute discharge-opening in line with said air-opening in the mixing-chamber, of a bracket provided with suitable guides, an oil-reservoir supported by said bracket and having a vapor-storage chamber therein, an air-chamber mounted over and arranged to surround said reservoir, lugs on said air-chamber casing arranged to engage and travel upon said guides on said bracket, a packing-ring mounted on said reservoir-casing and forming a seal to said air-chamber, a valved air-supply tube for supplying air to said air-chamber, an air-tube communicating with said air-chamber and with said reservoir, a supply-

pipe communicating with said reservoir and with the vaporizer, a valve for regulating the supply through said supply-pipe, a vapor-pipe communicating with said vapor-storage chamber and with the mixing-chamber, and a valve for controlling such communication, substantially as set forth.

5. In a vapor-burning lamp having a supply-reservoir, a vapor-storage chamber formed in said reservoir, a bracket provided with vertical guides supporting said reservoir, an air-chamber mounted over and adapted to surround said reservoir, lugs on said air-chamber casing arranged to engage and travel upon said guides on said bracket, a packing-ring mounted on said reservoir-casing and arranged to form a seal to said air-chamber, a valved air-tube for supplying air to said air-chamber, an air-tube communicating with said air-chamber and said reservoir, a supply-pipe leading from said reservoir, and a vapor-pipe leading from said vapor-storage chamber, substantially as set forth.

6. In a vapor-burning lamp having a supply-reservoir, a vapor-storage chamber formed in the top of said reservoir, a casing formed by an extension of the sides of said reservoir, and forming a cup surrounding said vapor-storage chamber, and a tube communicating with said cup and with said reservoir, substantially as set forth.

7. In a vapor-burning lamp having a supply-reservoir, the combination with a vapor-storage chamber formed in the top of said reservoir, a casing formed by an extension of the sides of said reservoir, having an inturned rim, and forming a cup surrounding said vapor-storage chamber, and a tube communicating with said cup, and with the reservoir, of a bracket supporting said reservoir, and provided with vertical guides, an air-chamber mounted over and adapted to surround said reservoir, lugs on said air-chamber casing, arranged to engage and travel upon said guides on said bracket, a packing-ring mounted on said rim on said reservoir-casing arranged to form a seal to said air-chamber and means for admitting air into said air-chamber, substantially as set forth.

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