

No. 632,492.

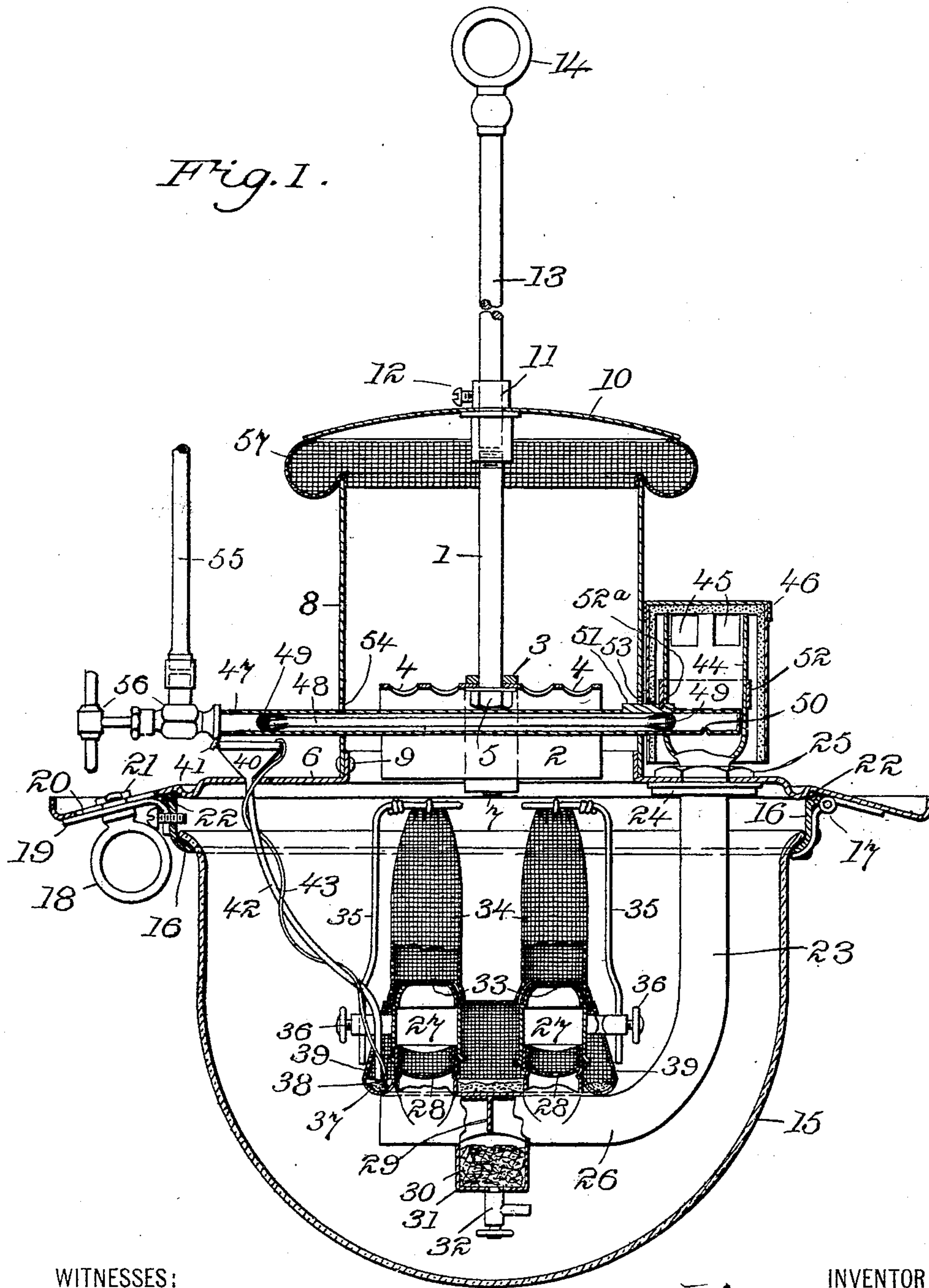
Patented Sept. 5, 1899.

A. KITSON.  
VAPOR BURNING APPARATUS.

(Application filed Aug. 27, 1898.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

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2 Sheets—Sheet 2.

Fig. 2.

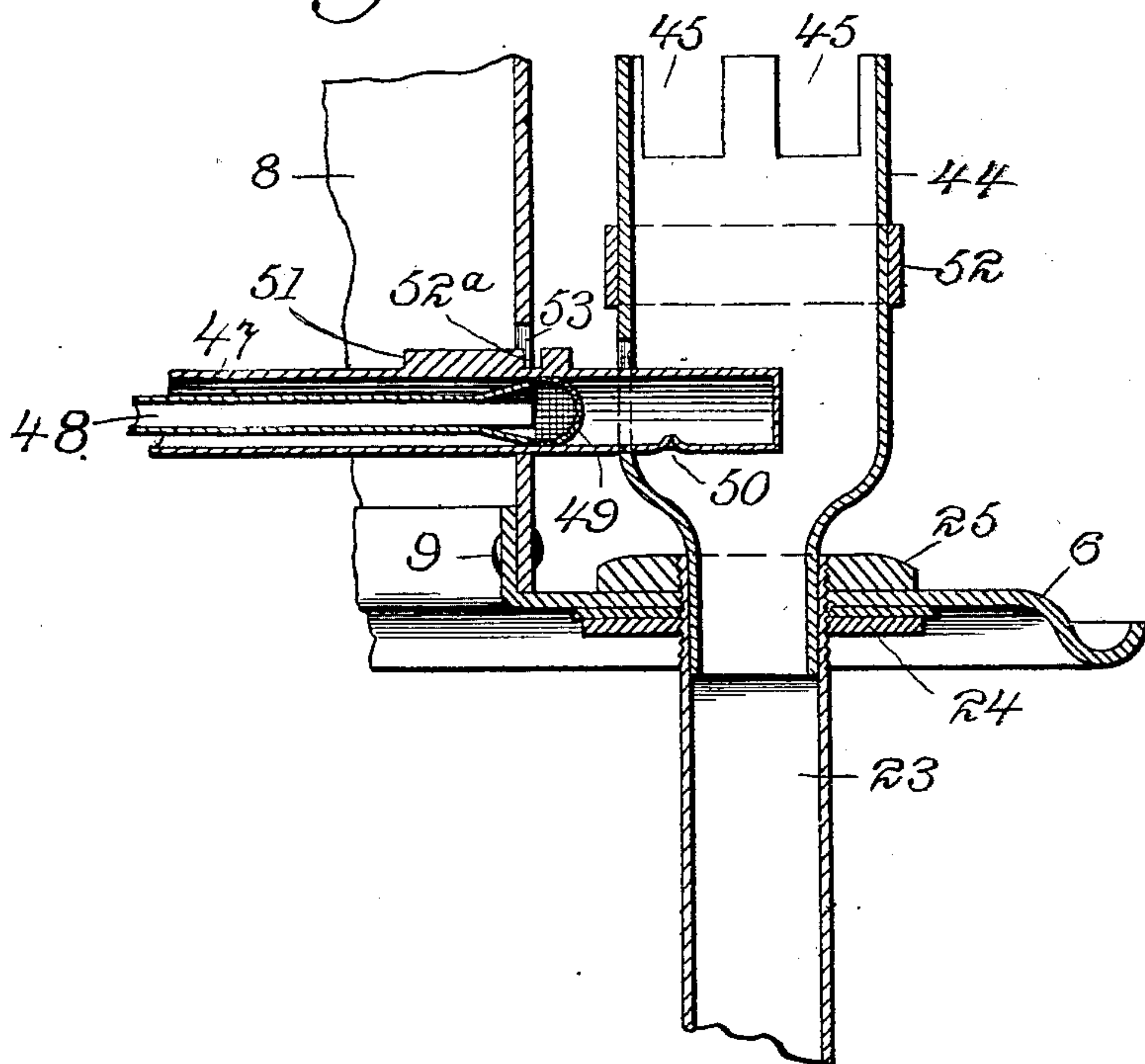
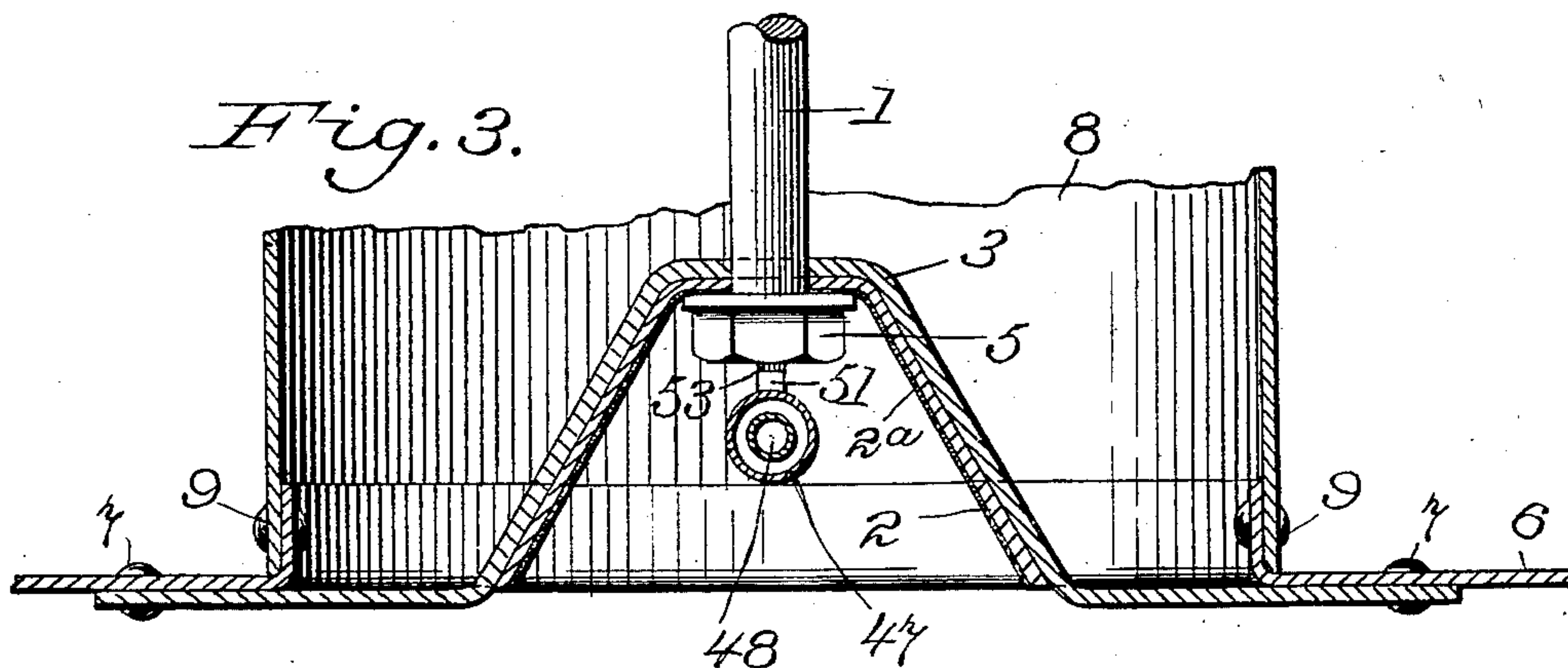


Fig. 3.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

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## VAPOR-BURNING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 632,492, dated September 5, 1899.

Application filed August 27, 1898. Serial No. 689,658. (No model.)

*To all whom it may concern:*

Be it known that I, ARTHUR KITSON, a sub-  
ject of the Queen of Great Britain, and a resi-  
dent of Philadelphia, county of Philadelphia,  
5 State of Pennsylvania, have invented certain  
new and useful Improvements in Vapor-Burn-  
ing Apparatus, of which the following is a  
specification.

My invention relates to vapor-burning  
10 lamps, and is more specifically designed to  
produce an improved form of suspension-  
lamp employing two or more incandescent  
mantles, commonly known as "Welsbach"  
mantles, under which a mixture of kerosene-  
15 oil vaporized by the heat of the lamp itself  
is burned after admixture with a regulated  
quantity of air.

The invention also includes an improved  
method of burning such vapor in a casing  
20 which is practically air-tight, with the ex-  
ception of an outlet for the discharge of the  
gases of combustion, the air brought in in  
combination with the vapor being the only  
air admitted to the interior of the lamp.

My invention further relates to an improved  
25 construction of the parts of the lamp, where-  
by all soldered or brazed joints exposed to in-  
tense heat above the level of the burners are  
done away with and riveted or screwed joints  
30 substituted which cannot possibly be melted  
by the heat of the lamp and whereby the va-  
rious parts of the lamp interlock and are held  
firmly in their proper relative positions dur-  
ing the operation of the lamp and at the same  
35 time are capable of easy and prompt disen-  
gagement and removable for purposes of re-  
placement, repair, or cleaning.

My invention further relates to other im-  
portant details of construction hereinafter to  
40 be more fully described.

The preferred form of apparatus for em-  
bodying and carrying out my invention is  
illustrated in the accompanying two sheets  
of drawings, in which—

45 Figure 1 is a vertical central section of the  
lamp with parts assembled. Fig. 2 is a de-  
tail section taken at right angles to Fig. 1,  
showing the method of attachment of the heat-  
shield to the adjacent portions of the lamp.

Fig. 3 is an enlarged detail showing the method 50  
of assembling the vaporizing-tube, the mix-  
ing-tube, and adjacent parts.

Throughout the drawings like reference-  
figures refer to like parts.

1 represents the hanging or supporting rod 55  
by which the lamp is suspended.

2 is a heat-shield having the cross piece or  
bridge 3 in conjunction therewith and the  
openings 4 4, &c., for the passage of hot gases.

5 is a nut screwed onto the lower end of the 60  
hanging-rod 1 and supporting the heat-shield  
and its coöperating bridge-piece 3. The in-  
ner surfaces of said heat-shield are prefer-  
ably covered with white enamel or other sub-  
stance which will make a reflector capable 65  
of standing intense heat. (Such coating is  
shown in Fig. 3, marked 2<sup>a</sup>.)

6 is an annular heat-deflecting plate, to  
which the bridge-piece 3 is attached by riv-  
ets 7. This plate 6 may also be enameled or 70  
otherwise treated, so as to serve as a light-  
reflector as well as a heat-deflector.

8 is a chimney attached to the plate 6 by  
rivets 9, and 10 is a smoke-bell mounted on  
the sleeve 11, which is screwed onto the top 75  
of the hanging-rod 1 and which has the set-  
screw 12, by which it is fastened on the rod  
13, provided at its upper end with a ring 14.

The plate 6, chimney 8, and heat-shield 2  
form together a supporting-frame suspend- 80  
ed from the ring 14. This frame supports  
on the under side the hemispherical glass  
globe 15, which is mounted on the ring 16,  
attached at one side to the plate 6 by the  
hinge 17 and at the other side by the turn- 85  
buckle 18, mounted in a projecting lug 19,  
and passing through a slot-shaped opening 20  
in the plate 6. This turnbuckle has project-  
ing prongs 21, which pass through the plate  
6 when parallel to the slot-shaped opening 20, 90  
but which cannot be withdrawn when turned  
crosswise of said opening.

A gasket 22 of asbestos or other suitable  
material is interposed between the ring 16  
and the plate 6, and another gasket of similar 95  
material may be inserted between the out-  
wardly-turned lip on the globe 15 and said  
supporting-ring 16, so as to form a practically



air-tight connection between said globe 15 and the plate 6.

23 is a mixing-tube extending down from the plate 6, to which it is attached by means of the flange 24 and cooperating nut 25. The flange 24 is preferably made adjustable by screwing it on the tube 23. This mixing-tube has a horizontal portion 26, supporting the two burner-tubes 27 27, in which are placed thimbles 28 28 of wire-gauze. Between the two burner-tubes is located the baffle-plate 29. On the under side of the portion 26 of the mixing-tube and preferably directly beneath the baffle-plate 29 is the oil-pocket 30, in which is a mass of absorbent material 31, preferably asbestos fiber. At the bottom of the oil-pocket is an opening 32, controlled by some convenient means, such as a drip-cock, as shown. On the upper end of the burner-tubes are the gauze diaphragms 33 33 and over said burners are mounted Welsbach mantles 34, supported by any convenient means, such as the wires 35 35, adjustably mounted at the sides of the burners by means of the set-screws 36 36.

37 is a shallow cup for alcohol surrounding the burners or located adjacent thereto, so as to come under the vaporizing-tube, having a mass of asbestos 38 arranged therein. 39 is a converging shell of wire-gauze mounted on said cup in the manner and for the purpose described and claimed in my application, Serial No. 674,573, filed March 21, 1898.

40 is a feeding-funnel mounted on the outside of the plate 6, having the plunger 41, closing the opening in the bottom thereof, all as described in my above-mentioned application.

42 is a tube connecting said feeding-funnel with the alcohol-cup 37, and 43 is a wick of asbestos fiber or other absorbent incombustible material extending from said feeding-funnel 40 to the alcohol-cup 37. Said wick may pass through the side of said feeding-funnel, if desired.

44 represents an enlarged mouthpiece fitting into the upper end of the mixing-tube 23, having openings 45 in its upper portion for the admission of air.

46 is a muffler lined with asbestos or lead or other non-resonant material, as described in my above-mentioned application, fitting over the mouth of this mixing-tube extension 44.

47 represents the vaporizing-tube, having the internal closed tube 48 and gauze thimbles 49 49, as described and claimed in my application filed of even date herewith, Serial No. 689,657.

50 is a discharge-opening formed in the under side of the vaporizing-tube over the mouth of the mixing-tube, and 51 is a feather on the other side of the vaporizing-tube which engages with the slot 53 in the chimney and keeps the vaporizing-tube in the proper position. 54 is a similar slot in the other side of

the chimney to permit of the withdrawal of the vaporizing-tube.

52 is a ring slipping over the mouth 44 of the mixing-tube and fitting down into a notch 52<sup>a</sup> in the feather 51, as more clearly shown in Fig. 3.

55 is the oil-supply tube, and 56 is a valve of any suitable construction for controlling the flow of oil from said tube to the vaporizing-tube 47.

57 is a strip of wire-gauze surrounding the opening between the top of chimney 8 and the smoke-bell 10. This is given the downwardly-curved shape shown, so as to form a receptacle for any scale that may fall off the gauze and prevent it from falling down onto the mantles and ruining them.

The method of operation of my invention is as follows: A quantity of alcohol is deposited in the feeding-funnel 40 sufficient to fill the same. Said feeding-funnel is of approximately the same capacity as the alcohol-cup 37. The plunger 41 (the end of which only is shown) is then lifted and the alcohol flows down through the tube 42 to the alcohol-cup, saturating the asbestos therein contained. The asbestos wick 43 becomes also saturated with alcohol during this operation and on touching a light to it the flame runs down said wick to the alcohol-cup and ignites the vapor of alcohol there being generated. The heat thus generated is focused upon the vaporizing-tube 47 by reason of the fact that the current of heated air flows directly up through the chimney 8. In case the amount of air supplied through the mixing-tube 23 is not sufficient for the proper burning of the alcohol the glass globe 15 may be dropped down on the hinge 16 by releasing the turnbuckle 18, and then after the lamp is properly in operation the globe may be swung up again and locked in position. When the vaporizing-tube has been raised to the proper temperature, the valve 56 is opened and the oil-supply, by the tube 55, under pressure, is forced into the vaporizing-tube. It is there vaporized by the heat and a jet of vapor is discharged from the opening 50 down the mixing-tube 23. This jet entrains a quantity of air with it and the mixed vapor and air is fed to the vapor-burners 27 27. The vapor and air emerging from said burners are ignited by the alcohol-flame and the incandescent mantles become heated and give off a powerful white light. The heat of the upward current of gases maintains the vaporizing-tube at the proper temperature and the action of the lamp becomes self-supporting. The baffle-plate 29 checks the flow of vapor and air in part and equalizes the pressure of the same at the two burners. Any particle of oil which passes through the vaporizing-tube without being vaporized or which is condensed in the mixing-tube drops into the fibrous material 31 in the oil-pocket 30, and the forcing of the current of vapor to turn a corner around the baffle-plate tends to



assist in this disposition of any entrained particles of liquid in the oil-pocket. The oil so deposited on the fibrous material 31 is gradually vaporized by the passing current of air and vapor and passes up through the burners for combustion. Any particles of dirt or asbestos shreds which are carried up toward the burners are caught by the gauze thimbles 28 28 and prevented from passing up to the burner-mouth. These thimbles can be removed and cleaned when necessary. They also assist in diminishing the noise produced by the burner.

If an unusually large quantity of oil passes down into the oil-pocket, it may be removed by opening the drip-cock 32. For the purpose of replacing the mantles or cleaning or adjusting the burner parts the hemispherical glass globe 15 may be swung to one side by releasing the turnbuckle 18. During the operation and lighting of the lamp, however, said globe does not need to be removed, and the only air admitted to the globe is that coming down the mixing-tube 23 in combination with the vapor. This protects the mantles from any cool drafts of air whatsoever and maintains them steadily at a high degree of incandescence. It also protects the burners from any side drafts of air and causes the lamp to burn steadily even if quite violently swung from side to side or lifted up and down. This construction also constitutes a safeguard against fire in case of the flooding of the lamp with oil. In some cases through imperfect action of the valve the oil is supplied faster than it can be vaporized and goes through the vaporizing-tube down the mixing-tube to the burner, where it catches fire when there is a sufficiency of air to support combustion and blazes up, ruining the lamp and in some cases starting a general conflagration. In my construction, however, the discharge of oil into the mixing-tube fills the lower end of the same and the burner with oil and shuts off any further access of air to the interior of the lamp. Accordingly the lamp goes out and no danger of fire or the smoking and overheating of the lamp results.

The upward current of hot gases and such light-rays as are radiated upward are focused on the vaporizing-tube by the reflecting heat-shield 2.

In taking the lamp apart the muffler 46 is lifted off and the ring 52 lifted up, as shown in Fig. 3, when the vaporizing-tube may be withdrawn, as also indicated in said figure. When the burner itself is to be taken out of the lamp, the mouthpiece 44 of the mixing-tube is removed and the nut 25 unscrewed, when the mixing-tube and the burner supported thereby may be removed from the supporting-frame. The burner and mantles may be adjusted at the proper distance from the vaporizing-tube by adjusting the nut 25 and screwing the flange 24 on the mixing-tube 23.

The wire-gauze 57 covering the opening between the chimney and the smoke-bell performs a double function, in that it prevents the flame from escaping from the lamp when it flares up, as in the case of lighting the lamp sometimes, or in case of an accident. This is necessary to prevent accident by fire in certain localities—as, for instance, in a cotton-mill. It also steadies the upward flow of the heated gases and to a limited extent retards the same, so as to insure maintaining the vaporizing-tube in a uniform bath of hot gases. It also prevents blasts of cold air from being forced down the chimney and keeps insects from entering and falling onto the mantles, thereby ruining them.

The feather 51 on the side of the vaporizing-tube maintains it in the proper position, so that the jet discharged from the opening will pass down the mixing-tube. The ring 52 holds the vaporizing-tube in a fixed relation to the mixing-tube and insures the centering of the discharge-opening 50 over the mouth of the mixing-tube.

The advantages of my improved apparatus and method have been in part set out by the foregoing description. As described, the action of the lamp is steady and absolutely unaffected by external conditions of the atmosphere, &c. All the joints above the plane of the burners are either riveted or screwed, so that there is no danger of their melting and the lamp falling apart. All the principal parts of the lamp interlock one with the other and while firmly and positively held in place can be readily disengaged. The most intense and perfect combustion is secured, whereby the mantles are raised to the highest degree of incandescence and at the same time are protected from any drafts of air or variations of temperature which might tend to shrink or crack them. If by any chance a particle of oil gets into the mixing-tube, it is caught in the material 31 and slowly evaporated under the heat of the burner parts instead of being rapidly evaporated, as is the case where it is deposited on a metallic surface and the lamp caused to flare up and smoke by the excess of vapor thereby delivered to the burner.

It is evident that various changes could be made in the details of construction in my apparatus without departing from the spirit and scope of my invention so long as the relative arrangement of parts shown in the drawings and the mode of operation described in the specification are preserved.

Having therefore described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. In a vapor-burning lamp the combination of the vapor-burner, the incandescent mantle therefor, the inclosing air-tight casing having only an outlet of restricted cross-section for the gases of combustion just sufficient to carry off said gases, but not large enough to permit the entry of outside air, and the mixing-tube



which extends from the top of the exterior of the casing downwardly and connects to the burner.

2. In a vapor-burning apparatus the combination of the burner, the inclosing casing, the alcohol-cup adjacent to said burner, and the wick of absorbent incombustible substance extending from the alcohol-cup to and through the inclosing casing, together with the feeding-funnel mounted on the exterior of the inclosing casing and connected by a tube with the alcohol-cup, in which feeding-funnel the outer end of the above-described wick is placed.

3. In a vapor-burning lamp the combination of the vapor-burner, the incandescent mantle therefor, the inclosing air-tight casing having an outlet for the gases of combustion, the mixing-tube extending from the exterior of the casing and connecting with the burner, the alcohol-cup adjacent to the burner, the feeding-funnel mounted on the exterior of the casing and connected by a tube with the alcohol-cup, and the wick of absorbent incombustible material extending from the feeding-funnel to the alcohol-cup.

4. In a vapor-burning lamp the combination of the vapor-burners, mantles therefor, the inclosing casing, the chimney, the smoke-bell of greater diameter than the chimney, and the curved wire-gauze extending outwardly from the upper end of the chimney and upwardly to the smoke-bell.

5. In a vapor-burning apparatus the combination of the double burner, the mixing-tube extending along and connecting with each burner-tube, and the baffle-plate located in said mixing-tube between said burner-tubes.

6. In a vapor-burning apparatus the combination of the double burner, the mixing-tube extending along and connecting with

each burner-tube, and the baffle-plate located in said mixing-tube between said burner-tubes, together with the oil-pocket in said mixing-tube directly beneath said baffle-plate, and a mass of absorbent material in said pocket.

7. In a vapor-burning apparatus the combination of the mixing-tube, the vaporizing-tube extending into the same at an angle thereto, and provided with a recess on its exterior adjacent to said mixing-tube, and a ring adapted to slip over said mixing-tube and engages said recess on the vaporizing-tube.

8. The combination in a vapor-burning lamp of the supporting-frame, the mixing-tube and the vaporizing-tube, each of said parts loosely interlocking with another but devoid of permanent fastenings one to another.

9. The combination in a vapor-burning lamp of the supporting-frame and a removable vaporizing-tube provided with a longitudinally-extending feather which engages a slot in the supporting-frame.

10. The combination in a vapor-burning lamp of the supporting-frame, and a removable vaporizing-tube provided with a feather which engages a slot in the supporting-frame, said vaporizing-tube being provided with a discharge-opening on one side whereby the feather serves to fix the direction of the jet discharged from said opening.

11. The combination in a vapor-burning lamp of the reflector, chimney and heat-shield, riveted together to form a supporting-frame, the vaporizing-tube extending across the base of the chimney under the heat-shield, and the hanging-rod attached to said heat-shield.

Signed by me at Philadelphia, Pennsylvania, this 25th day of August, 1898.

ARTHUR KITSON.

Witnesses:

CHARLES A. LAGEN,  
PHOEBE A. REED.