

No. 667,227.

Patented Feb. 5, 1901.

A. KITSON.

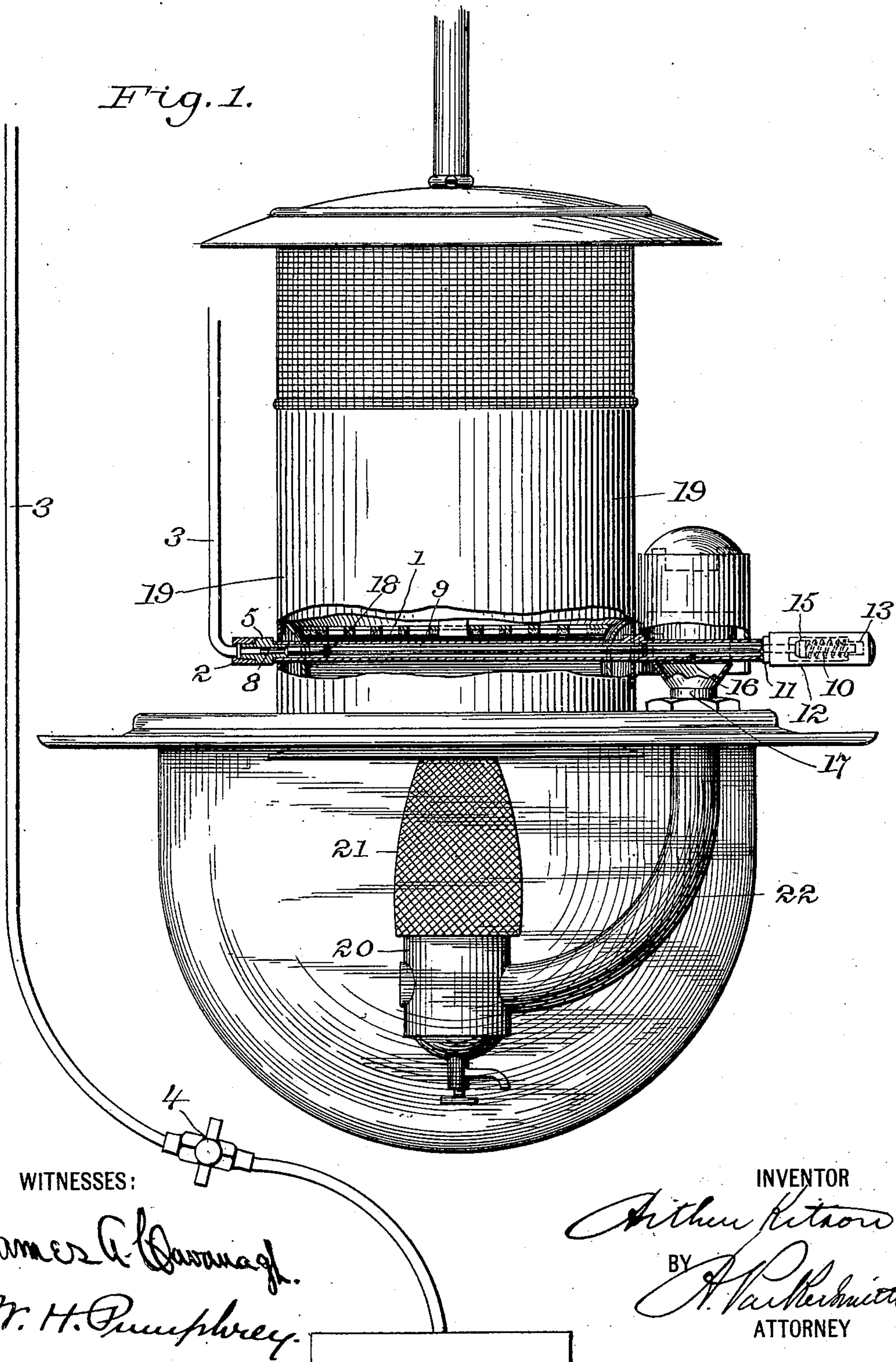
THERMOSTATIC VALVE AND VAPOR TUBE.

(Application filed Feb. 15, 1900.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



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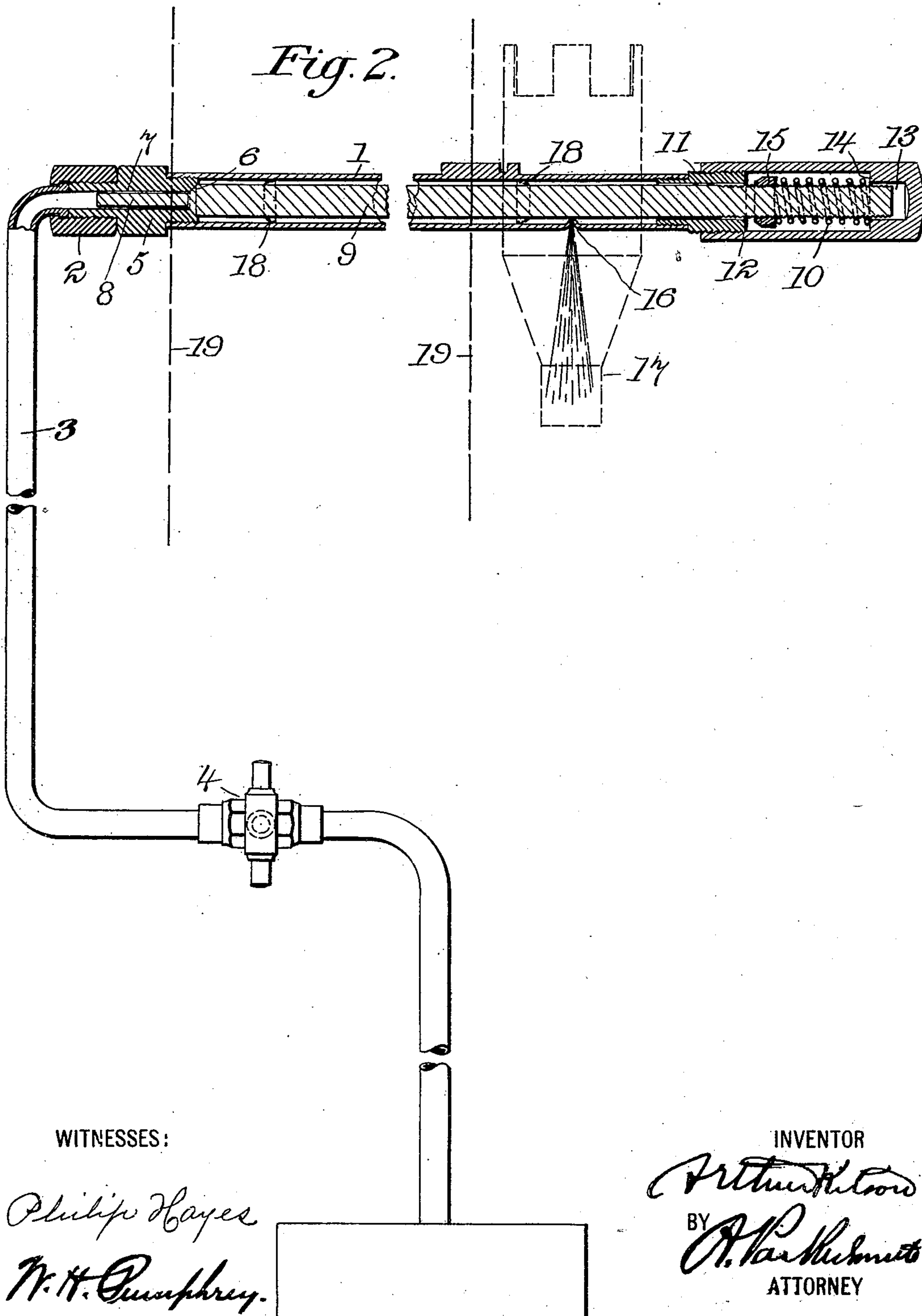
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THERMOSTATIC VALVE AND VAPOR TUBE.

(Application filed Feb. 15, 1900.)

(No Model.)

2 Sheets—Sheet 2.



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# UNITED STATES PATENT OFFICE.

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## THERMOSTATIC VALVE AND VAPOR-TUBE.

SPECIFICATION forming part of Letters Patent No. 667,227, dated February 5, 1901.

Application filed February 15, 1900. Serial No. 5,304. (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, (Germantown,) county  
of Philadelphia, State of Pennsylvania, have  
invented certain new and useful Improve-  
ments in Thermostatic Valves and Vapor-  
Tubes, of which the following is a specifica-  
tion.

My invention relates generally to vapor-  
burning apparatus, and more specifically con-  
sists of an automatic valve constructed and  
located to operate thermostatically in admit-  
ting, regulating, and cutting off the supply  
of oil to the vaporizing-chamber of the appa-  
ratus.

In the various forms of apparatus burning  
the vapor of a fluid hydrocarbon supplied  
under pressure considerable difficulty has  
been experienced in thermostatically regulat-  
ing the admission, supply, and cut off of oil  
to the vaporizing-chamber. Such difficulty  
arises mainly from the failure of the thermo-  
stat to maintain the inlet closed until the  
temperature of the chamber has been raised  
to the vaporizing-point, which results in flood-  
ing the chamber, clogging the vapor-outlet,  
or discharging the oil upon the furniture or  
contents of the room in which the lamp is be-  
ing operated, &c.

It is the object of my invention, therefore,  
to obviate the objections above mentioned  
through the employment of a thermostatic  
valve normally closed at atmospheric tem-  
perature to cut off all flow of oil and which  
opens to admit oil to the vaporizing-chamber  
only when the temperature of the same has  
been raised to the point of vaporization or  
nearly to said point.

The preferred form of apparatus embody-  
ing my invention is illustrated in the accom-  
panying two sheets of drawings, throughout  
the views of which like characters refer to like  
parts.

In the drawings, Figure 1 is a view in ele-  
vation of a well-known form of vapor-burn-  
ing lamp, showing my invention applied  
thereto, the casing of the lamp being broken  
away to more clearly illustrate the relative  
arrangement of the vaporizing-tube, which

latter is shown partly in section; and Fig. 2  
is a detail sectional view of the vaporizing-  
tube, the casing and upper end of the mix-  
ing-tube being indicated therein in dotted  
lines.

The lamp illustrated in the drawings is a  
form well known and now in general use, and  
it is not therefore deemed necessary to de-  
scribe the same in detail. Generally the lamp  
consists of a burner 20, having a mantle 21  
suitably supported above the same and sup-  
plied with a mixture of air and vapor by way  
of a tube 22. The burner and mantle are  
preferably inclosed by a hemispherical globe  
hinged to the lamp-casing, and from this cas-  
ing a chimney 19 rises to provide escape for  
the products of combustion. Alined open-  
ings are provided in the chimney and upper  
end of the mixing-tube for the insertion of  
the vaporizing-tube, which latter lies trans-  
versely across the chimney and within the  
heating zone of the burner.

The vaporizing tube or chamber 1 is con-  
nected to the oil-supply pipe 3 by means of  
a threaded union 2 in the well-known way.  
The pipe 3, leading from a source of oil-sup-  
ply, is controlled by any suitable form of  
valve 4 which is capable of accurate adjust-  
ment to prevent the discharge of oil under  
pressure or to permit the flow of the same in  
requisite quantities.

The end of the vaporizing-tube at which  
the oil is admitted is preferably made in the  
form of a casting 5, having a tapering valve-  
seat formed therein for the correspondingly-  
tapered cone-valve 6 and a central bore 7, ex-  
tending from the valve-seat throughout its  
length, of a diameter slightly in excess of the  
valve-stem 8, so that when the valve is open  
the oil will be admitted to the tube in the  
form of a thin film.

Within the body of the vaporizing-tube, and  
preferably concentric with the axis thereof, a  
rod or filler 9 is mounted to have a limited  
movement under the influence of a spring 10.  
This rod is integral with and forms a contin-  
uation of the valve 6 and is centered with re-  
lation to the tube by the valve and stem at  
one end in the casting 5 and at the opposite  
end by a hollow plug 11, through which the



valve-rod extends loosely. The plug 11 is threaded into and shouldered to close the open end of the vaporizing-tube and is also provided exteriorly with an additional thread 5 throughout its larger diameter for engagement with a cap 12. This cap serves to inclose the projecting end of the valve-rod and is socketed at 13 and shouldered at 14 to allow for the play of the rod and provide a bearing 10 for the spring 10, which encircles that portion of the valve-rod within the cap.

A nut 15, threaded upon the valve-rod, provides a shoulder against which the opposite end of the spring abuts and at the same time, 15 in coöperation with outer end of the plug 11, serves as an adjustable stop for limiting the movement of the valve-rod under the action of its spring. This spring 10 is preferably made of "self-tempering steel," such being 20 the name of a species of steel on the market which when cooling down after heating regains the temper which it has lost while being raised to high temperature, and thereby remains unaffected by the heat generated in 25 operation of the lamp.

16 represents the vapor-discharge opening in the lower side of the tube, and 17 the upper end of the mixing-tube, which is relatively arranged to receive the jet of vapor, as 30 indicated.

18 represents gauzes which may be inserted in the vaporizing-tube and arranged concentrically about the valve-rod.

As shown, the main portion of the thermostatic valve and its rod lie within the casing 35 in position to be surrounded by the hot gases, &c., in their escape from the burner to the chimney. It will also be seen that the valve-spring and its containing compartment will 40 lie outside of the casing in an exposed position and under the cooling action of the air at atmospheric temperature will be more or less protected from the heat generated by the burner. This arrangement also serves to facilitate adjustment or examination of the 45 valve, in that the latter is at once accessible on removing the inclosing cap at the outer end of the tube.

The mode of operation of my invention is 50 as follows: On inserting the vaporizing-tube in the lamp or other vapor-burning apparatus the nut is adjusted upon the rod to seat the valve under the tension of its spring, and all access of oil to the vaporizing-chamber is 55 thereby prevented. Thus adjusted there will be more or less clearance between the nut and the outer end of the screw-plug 11 to allow for a limited "follow-up" movement of the valve under the influence of the spring as the 60 seat is thermostatically moved by the longitudinal expansion of the vapor-tube. It should be understood that the right-hand end of the vapor-tube is held practically stationary in its relation to the mixing-tube 17 in order 65 that the jet of vapor from the discharge-opening 16 may be always centered accurately with respect to the mouth of the mixing-

tube. The right-hand end of the tube being thus held rigidly, the left-hand end, consisting of the casting 5, in which the valve-seat 70 is formed, will move farther to the left when the tube is heated and returned toward the right hand when the tube contracts on cooling down. When the preheating of the vaporizing-tube by the flame of a torch or a 75 Bunsen burner is brought about in any one of the well-known ways for the purpose of starting the lamp into operation, the tube 1 will expand faster than the rod 9, owing to the direct contact with the heating agent, and 80 will thereby tend to carry the valve-seat away from the valve and permit oil to pass at once into the vaporizing tube or chamber. As the premature admission of oil would tend to flood and clog the vapor-outlet, the valve is 85 caused to remain seated by the follow-up movement toward the left hand imparted to it by the spring and is thus relatively maintained until checked by the nut bringing up against the end of the screw-plug, when, the 90 seat being free, it is carried away from and clears the valve by the continued expansion of the vapor-tube and the oil under pressure passes into the vaporizing-chamber, where it is converted into vapor and issues from the 95 orifice 16 in the form of a jet. The vapor thus formed is burned in the vapor-burner in the well-known way, and the heat of the burner maintains the tube 1 at the necessary temperature for continued vaporization of 100 the oil. As long as this temperature is maintained the valve will remain open, and owing to the presence of the vapor within the tube the temperature of the valve-rod will be prevented from rising to a degree to cause sufficient expansion thereof to close the valve. 105 If, however, the lamp goes out for any reason whatever, the vaporizing-tube will cool down rapidly by being exposed to the current of cold air passing through the lamp and will 110 contract with greater rapidity than the rod, thereby returning the seat toward the right hand toward the valve and closing the same to prevent further entrance of oil. The tube in cooling down first seats the valve and closes 115 the inlet to prevent further entrance of oil. Continued contraction of the tube then tends to move the valve thus seated in opposition to its spring, brings the same under the tension thereof, and establishes the requisite 120 clearance between the adjustable stop and the screw-plug.

Some of the main advantages of my invention lie in the saving of oil by preventing waste thereof through defective valve mechanism; further, in regulating the admission 125 of oil to prevent flooding of the vaporizing-chamber and clogging of the vapor-outlet; further, in effecting a slow or retarded opening and a quick closing of the inlet-valve 130 through the positive action of a spring; further, in the applicability of the mechanism to vapor-tubes now in general use without material change or alteration in the construc-



tion or form of the same, and, finally, in the ready adjustability of the device, &c.

It is evident, of course, that various changes could be made in the details of construction illustrated without departing from the spirit and scope of my invention so long as the principle of operation described in the specification or the general relative arrangement of parts illustrated in the drawings is preserved. Other forms of thermostat might be employed and different forms of valve might be substituted. The thermostat might be differently located so long as it is within the heating zone of the lamp-burner and of the preheating device.

Having therefore described my invention, I claim—

1. The combination with a vapor-burning apparatus of a metallic vaporizing-chamber provided with requisite inlets and outlets, a valve mounted in the inlet, means whereby the expansion of the metal of the vaporizing-chamber shall open the valve, and a spring which tends to hold the valve to its seat.

2. The combination with a vapor-burning apparatus, of a metallic vaporizing-chamber provided with requisite inlets and outlets, a valve mounted in the inlet, means whereby a predetermined degree of expansion of the metal of the vaporizing-chamber shall open the valve, and a spring which tends to hold the valve to its seat until such predetermined degree of expansion has occurred.

3. The combination with a vapor-burning apparatus of a vaporizing-chamber, a valve controlling the inlet to said chamber, a spring holding said valve against its seat, and cooperating shoulders on the valve-rod and on the vaporizing-tube, which shoulders are separated while the vaporizing-tube is below the temperature necessary to vaporize oil, but which shoulders are so located that the expansion of parts when raised to the temperature of vaporized oil will bring said shoulders into contact to open the valve.

4. The combination with a vapor-burning apparatus, of a vaporizing-chamber provided with requisite inlets and outlets, a valve seated in the inlet, said valve and its seat being thermostatically separable and movable in the same direction under expansion or contraction at different rates of speed, and a spring for imparting a follow-up movement to the valve to prevent premature opening of the inlet.

5. The combination with a vapor-burning apparatus, of a vaporizing-chamber provided with requisite inlets and outlets, a valve seated in the inlet, said valve and its seat being thermostatically separable, a spring for imparting a follow-up movement to the valve to prevent premature opening of the inlet and a stop limiting such follow-up movement.

6. The combination with a vapor-burning apparatus, of a vaporizing-chamber provided with requisite inlets and outlets, a valve seated in the inlet, said valve and its seat be-

ing thermostatically separable, a spring for imparting a follow-up movement to the valve to prevent premature opening of the inlet and an adjustable stop limiting such follow-up movement.

7. The combination with a vapor-burning apparatus, of a vaporizing-chamber provided with an inlet-valve seat thermostatically controlled in its position with relation to the valve and a spring-seated valve having a limited follow-up movement to prevent premature opening of the inlet.

8. The combination with a vapor-burning apparatus, of a vaporizing-chamber, provided with an inlet-valve seat thermostatically controlled in its position with relation to the valve, a valve closed while the parts are cold and a spring for imparting a follow-up movement to the valve to prevent premature opening of the inlet.

9. The combination with a vapor-burning apparatus, of a vaporizing-chamber provided with an inlet-valve seat thermostatically controlled in its position with relation to the valve, a valve closed while the parts are cold, a spring for imparting a follow-up movement to the valve and a stop for limiting such movement.

10. The combination with a vapor-burning apparatus, of a vaporizing-chamber provided with requisite inlets and outlets, a spring-actuated valve controlling the inlet, a valve-seat therefor thermostatically movable with relation to the valve and having sufficient movement during the contraction of the vaporizing-chamber to bring the valve under the tension of its spring.

11. The combination with a vapor-burning apparatus, of a vaporizing-chamber provided with requisite inlets and outlets, a spring-actuated valve having a limited movement, a valve-seat thermostatically movable toward and away from the valve and having a movement in one direction in excess of that of the valve to effect a separation and opening of the inlet.

12. The combination with a vapor-burning apparatus, of a vaporizing-tube, a valve controlling the oil-inlet at one end of the tube, said valve and its seat being thermostatically separable, a spring for advancing the valve in the direction of the valve-seat, said spring being operatively mounted within a removable section of the tube, as specified.

13. The combination with a vapor-burning apparatus and its casing, of a vaporizing-tube, a valve controlling the oil-inlet at one end of the tube, said valve and its seat being thermostatically separable, a spring for advancing the valve in the direction of the valve-seat, said spring being operatively mounted within a section of the tube exterior to the casing of the apparatus.

14. The combination with a vapor-burning apparatus and its casing, of a vaporizing-tube, a valve controlling the oil-inlet at one end of the tube, said valve and its seat being



thermostatically separable, a spring for advancing the valve in the direction of the valve-seat, said spring being operatively mounted within a removable section of the tube exterior to the casing of the apparatus.

15. The combination with a vapor-burning apparatus, of a vaporizing-tube, a valve controlling the oil-inlet at one end of the tube, said valve and its seat being thermostatically separable, a spring for advancing the valve in the direction of the valve-seat, said spring being operatively mounted within a compartment of the tube, separated from the vaporizing-chamber thereof.

16. The combination with a vapor-burning apparatus, of a vaporizing-tube, a valve controlling the oil-inlet at one end of the tube, said valve and its seat being thermostatically separable, a spring for advancing the valve in the direction of the valve-seat, said spring being operatively mounted outside of the vaporizing-chamber and a removable cap inclosing the spring.

17. The combination with a vapor-burning apparatus, of a vaporizing-tube, a valve controlling the oil-inlet at one end of the tube, said valve and its seat being thermostatically separable, a spring for advancing the valve in the direction of the valve-seat, said spring encircling a portion of the valve-rod lying within a compartment of the tube separated from the vaporizing-chamber thereof.

18. The combination with a vapor-burning apparatus, of a vaporizing-tube, a valve controlling the oil-inlet at one end of the tube, said valve and its seat being thermostatically separable, a spring for advancing the valve in the direction of the valve-seat, said spring encircling a threaded portion of the valve-

rod lying within a compartment of the tube separated from the vaporizing-chamber thereof, and a nut adjustable upon the threaded valve-rod and serving as a stop in limiting the action of the spring.

19. The combination with a vapor-burning apparatus, of a vaporizing-tube, a valve controlling the oil-inlet at one end of the tube, said valve and its seat being thermostatically separable, a spring for advancing the valve in the direction of the valve-seat, said spring encircling a threaded portion of the valve-rod lying within a compartment of the tube separated from the vaporizing-chamber thereof, and a nut adjustable upon the threaded valve-rod and cooperating with the end wall of the compartment in serving as a stop to limit the action of the spring.

20. The combination with a vapor-burning apparatus, of a vaporizing-tube, a valve controlling the oil-inlet at one end of the tube, said valve and its seat being thermostatically separable, a spring for advancing the valve in the direction of the valve-seat, said spring encircling a threaded portion of the valve-rod lying within a compartment of the tube separated from the vaporizing-chamber thereof, and a nut adjustable upon the threaded valve-rod and cooperating with the end wall of the compartment in serving as a stop to limit the action of the spring, and a removable cap constituting the inclosing casing of the spring-containing compartment.

Signed by me at New York, N. Y., this 8th day of February, 1900.

ARTHUR KITSON.

Witnesses:

W. H. PUMPHREY,  
PHILIP HAYES.