C. K. HARDING.

HYDROCARBON LIGHTING APPLIANCE.

APPLICATION FILED NOV. 11, 1910.

1,005,203. **Patented Oct. 10, 1911.**

Fig. 1.

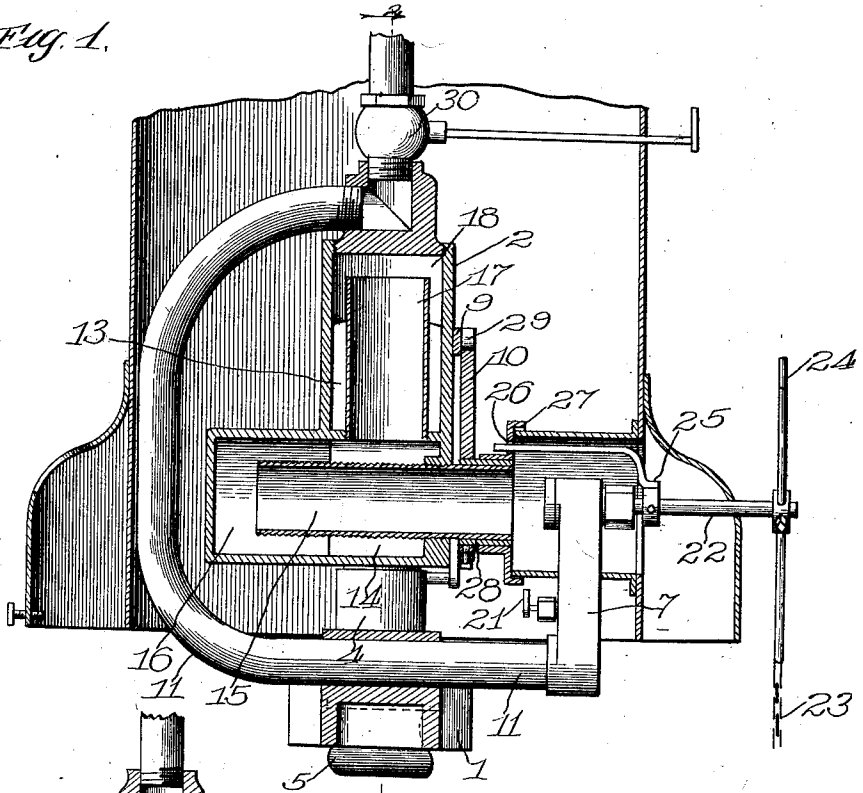


Fig. 2.

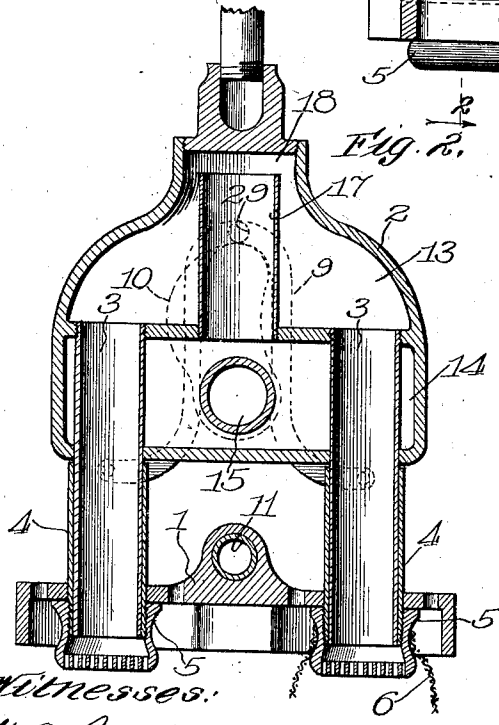
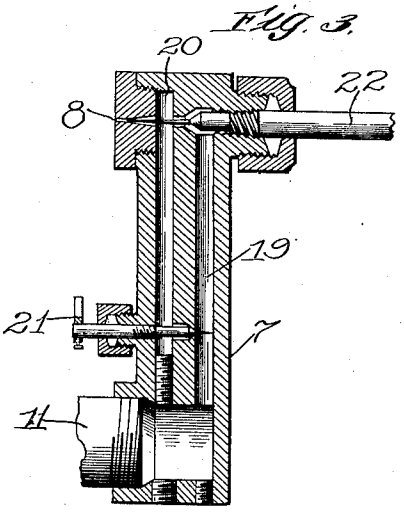


Fig. 3.



Witnesses:

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HYDROCARBON-LIGHTING APPLIANCE.

1,005,203. Specification of Letters Patent. **Patented Oct. 10, 1911.**

Application filed November 11, 1910. Serial No. 591,852.

To all whom it may concern:

Be it known that I, CHARLES KNOX HARDING, a citizen of the United States, and a resident of Woodlawn, city of Chicago, county of Cook, State of Illinois, have invented certain new and useful Improvements in Hydrocarbon-Lighting Appliances, of which the following is a specification, which will enable others familiar with the art to make and use the same, reference being had to the accompanying drawings, which form a part thereof.

My invention relates generally to hydrocarbon incandescent lighting systems, and more particularly to gasolene incandescent lights operating on what is known as the high-low systems of the class illustrated in my United States Patents No. 976,127 dated November 1st, 1910, and No. 983,227 dated January 31, 1911, and has special reference to vapor controlling means or appliances which may be applied to such lamps.

Among the objects of my invention is to produce an efficient light from the various grades of gasolene, in such a manner that it can be operated for long periods of time without liability of deposits or accumulations of less volatile matter being formed to prevent or interfere with its continuous use.

The principal features of the present invention relate to improved valved mechanisms, appliances or devices for regulating and controlling the hydrocarbon vapors and the volume and velocity of the flow of same from the vapor jet orifice in high-low lamps.

It is known that the ordinary commercial gasolene is a mixture of several hydro-carbons, part of which will condense at a relatively high temperature and especially under an increased pressure and this condensation results in the deposit of tarry matter especially at the orifice through which the vapor is discharged from the vaporizer into the Bunsen tube if the vapor is not supplied with sufficient heat. I aim to prevent this action by providing means for maintaining the heat necessary to prevent fractional condensation at said orifice in the passages leading thereto.

In the drawings which illustrate one embodiment of my invention, Figure 1 shows a vertical central section through the interior of a two mantle pendant lamp and shows a section of the heat collecting and conducting block 1 surrounding the vaporizing tube 11; Fig. 2 is a section on line 2—2 of Fig. 1 and shows a section through the burner body 2, its telescoping burner tubes 3—3, the adjustable burners 5—5 carried by the outer telescoping tubes 4—4, a section through the stationary vaporizing tube 11, surrounded by and carrying the heat collecting and conducting block 1; Fig. 3 shows an enlarged detail sectional view of the arm 7, which conveys the vapor from the end of the vaporizing tube to the jet orifice 8, and shows the valve mechanism for controlling the flow through both of the passages therein and illustrates the means by which I am enabled to supply a small weight of vapor expanded to a relatively large volume under a sufficiently lowered pressure and heated to a relatively high temperature to prevent the fractional precipitation of heavy hydrocarbons that would interfere with the continuous operation of the lamp when burning the least possible amount of oil.

As shown in the drawing, the lamp is adapted to operate and permit a relative movement of its parts so as to conform to the requirements of the two somewhat distinct sets of conditions. Among the desirable conditions when the lamp is burning low, the following may be mentioned: The vaporizing tubes and all the passages connected therewith must be kept hot enough to prevent fractional distillation of the mixed hydrocarbons of which commercial gasolene is composed, or fractional condensation of any part of the heavier hydrocarbons contained or produced therein during the operation of the lamp. The velocity of the flow of the vapor from the jet orifice should be lower and the percentage of air taken in with the mixture should be less than when used for incandescing a mantle, the Bunsen tube and passages through the metal parts of the burner body may be hotter, thus heating the air and vapor without disadvantage as the gauze opening will permit the passage of the necessary amount even when highly expanded and the heat absorbed by the mixture will be given off at the burner and help heat the vaporizing tube. A slower velocity of flow of mixture will permit heating and the burners may be closer to the burner body.

As illustrated in the drawings, Figs. 1

and 2, the moving parts of the lamp are shown in the position of the parts when the lamp is burning low.

The burner body 2 carries the downwardly extending tubes 3 surrounded by the telescoping sleeves 4. These burner tubes 4 carry at their lower end the burners 5, having perforated openings through their lower surface through which the gas mixture passes. The sliding burner tubes 4 are also provided with the bail 9 which is acted on by the cam 10, which serves to raise and lower the tubes and burners with relation to the burner body and the vaporizing tube. When the lamp is burning in the position shown, the flame will be small and close to the burner and may produce a small amount of light, but its main function is to keep the burner and heat conducting piece 1 at a high temperature. In the position shown the burners will be in close contact with the heat conveying metal block 1 surrounding the vaporizing tube 11. The burner body 2 also carries the Bunsen tube 15 extending horizontally across the central axis of the burner and terminating near the vapor discharge orifice. As shown in the drawings the burner body 2 has the two chambers 13 and 14, the tubes 3—3 extend through the lower chamber 14 and terminate in the upper chamber 13. The tube 15 which performs part of the function of a Bunsen tube extends horizontally across the central axis of the burner body from a point adjacent to the vapor jet orifice 8 on one side in an uninterrupted straight line for a sufficient distance to the other side of the central axis to allow the expanding stream of vapor from the jet orifice to spread to the full diameter of the Bunsen tube and impart its energy to the more slowly moving current of air. This straight tube should have an uninterrupted length of approximately six times its internal diameter to form an efficient air injecting or Bunsen tube. After passing through the tube 15 the mixture passes from the extension 16 of the chamber 14 back to the chamber 14 and thence perpendicularly up the tube 17 and thence through the upward extension 18 of the chamber 13 to the upper ends of the tubes 3 in chamber 13 and thence through the outer telescoping burner tube 4 to the burners 5. It is thus given the necessary length of travel and a sufficient mixture is secured.

Heretofore serious difficulties have been met where hydrocarbon vapors were discharged in small quantities from vapor jet orifices. Where vapors under rather high pressure pass through the jet orifice, the refrigerating action, that is the absorption of heat by the expansion of vapor escaping through the jet orifice, has a tendency to reduce the temperature of the metal parts adjacent to the orifice and frequently causes the precipitation of heavy hydrocarbons contained in the oil, a small percentage of which are of a complex heavy, tarry composition which are almost solid at ordinary temperatures. I have found that much of this clogging in hydrocarbon lamps or lighting devices may be overcome by avoiding insofar as possible this refrigerating action. In the present invention when the light is burning low, I arrange to reduce the pressure and expand the vapor at a point some distance away from the jet orifice, and arrange so that the vapor may absorb and regain a sufficient temperature before reaching the discharge orifice, so that this cooling effect at the jet will be largely overcome.

The arm 7 shown in Fig. 3 has the two parallel channels 19 and 20 extending throughout its length. The entrance of the vapor to the channel 20 is controlled by the valve 21, located near the vaporizer end of the arm 7, and the discharge from the channel 19 is controlled by the valve stem 22, which closes against the valve seat at the upper end of the channel 19 but leaves the channel in permanent communication with the vaporizer and the high pressure and temperature vapor therein. The valve stem 22 also has a needle projecting from the center of its end adapted to enter the jet discharge orifice and thus reduce its area about fifty per cent. This also acts as a cleaning needle so that when the valve stem 22 is advanced into the seat, it also inserts the needle into the jet orifice and reduces the effective area of same. When the stem and needle are moved in opposite direction, it simultaneously opens the valve and withdraws the needle from the jet orifice. This allows the full pressure of the vaporizer to be exerted on the vapor passing through the channel 19 and escaping from the orifice. The valve 21 may be so regulated as to produce the proper pressure in the channel 20 for maintaining the lamp in a generated condition with the least possible consumption of oil. The valve stem 22 carries at its outer end the arms 23 and 24 having chains depending from their lower ends, so that by pulling on one of the chains the stem is revolved a part of a revolution, which opens or closes the valve. The valve stem also carries an arm 25 which extends back through a notch 26 in a disk 27, carried by a sleeve 28, which revolves on the Bunsen tube 15. Said sleeve carries a cam 10 which operates to raise and lower the bail 9 by means of the anti-friction roller 28, so that when the lamp is burning for the production of light, the adjustable tubes and burners will be some distance below the vaporizing tube and the metal parts connected therewith. On pulling one of the chains and rotating the valve stem, the main discharge for the vapor will be closed and

the burners will be raised to the upper position in very close heating relation to the vaporizer tube. Beside the channel 19 in the arm 7 in permanent communication with the vaporizer one or more additional channels may be provided in the arm 7 parallel to and surrounding the channel through which the vapor passes from the vaporizer to the orifice in the jet nozzle.

Having now described my invention and illustrated one form of the device, by which it may be carried out, what I claim is:

1. A valved mechanism for controlling the flow of hydrocarbon vapor consisting of an arm having a jet discharge nozzle and a valve located at one end of said mechanism, two channels leading from the jet end to the other or inlet end of said arm, and means located at the inlet end of one of the channels for regulating and controlling the volume and pressure of the vapor flowing through one of said channels.

2. In a high low lighting apparatus the combination of a burner, a Bunsen tube, a vaporizer, a jet nozzle, and means for producing a low pressure flow of vapor in a passage heated by high pressure vapor leading from the vaporizer to the jet nozzle.

3. In a hydro-carbon lamp, the combination of an arm having a jet nozzle, a channel leading from the vaporizer to the jet nozzle, means for producing a low pressure flow of vapor through said channel and a channel carrying vapor at a higher pressure in said arm; whereby the low pressure vapor is heated by the hotter vapor in the high pressure channel.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses this 9th day of November, A. D. 1910.

CHARLES KNOX HARDING.

Witnesses:
GRACE WATTS,
G. A. TAUBERSCHMIDT.