(No Model.)

I. E. BLAKE & H. RAUCHFUSS.

HYDROCARBON BURNER.

No. 452,944. Patented May 26, 1891.

Fig. 1.

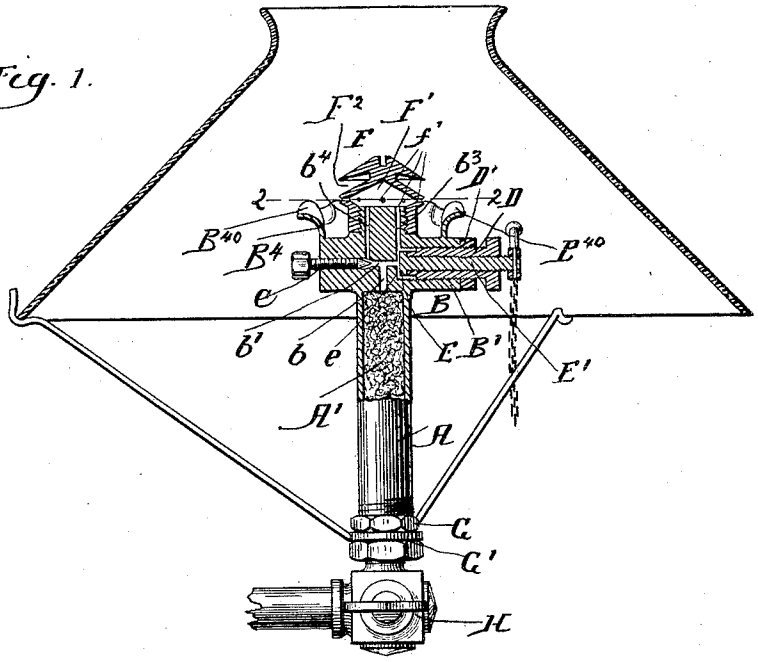
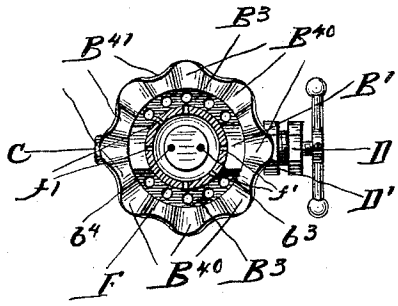


Fig. 2.



Witnesses:
Jean Elliott
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UNITED STATES PATENT OFFICE.

ISAAC E. BLAKE AND HERMAN RAUCHFUSS, OF DENVER, COLORADO.

HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 452,944, dated May 26, 1891.

Application filed April 17, 1890. Serial No. 348,301. (No model.)

To all whom it may concern:

Be it known that we, ISAAC E. BLAKE and HERMAN RAUCHFUSS, both citizens of the United States, residing at Denver, Colorado, have invented certain new and useful Improvements in a Hydrocarbon Illuminating-Burner, which are fully set forth in the following specification, reference being had to the accompanying drawings, forming a part thereof.

In the drawings, Figure 1 is a vertical axial section through the supply-stem and the controlling-valves of our improved burner. Fig. 2 is a sectional plan section, being made at the line 2 2 on Fig. 1.

This invention is designed to facilitate the use of hydrocarbon oils for illumination, and is adapted for use with the lighter and more volatile oils, such as naphtha or gasoline, which vaporize at a moderate heat. A difficulty or inconvenience heretofore experienced in the use of such oils for illumination by means of burners in which the oils are vaporized and ignited in the vaporous condition and without a wick arises from the necessity of bringing the vaporizing-chamber or burner-tip to a temperature sufficient to vaporize the oil as it is delivered thereto before clear and steady light can be obtained, and that some skill is requisite in order to gage the quantity of fluid which may be delivered to the burner at starting and while it is cold, so that the requisite temperature may be attained to vaporize the fluid without unduly prolonging the period of time during which the liquid will be burned directly and without vaporizing, as it must be at starting; and it is necessary when the burner is first lighted, having been cold before lighting, that the attendant shall carefully watch its operation until it commences to form vapor freely, in order that he may then properly regulate the supply to the point at which permanent and steady light may be produced from the vapor. Inexperienced persons are liable to admit too much liquid to the cold burner, flooding and soiling it and causing it to become sooty before it begins to make vapor or by admitting an insufficient quantity to fail to heat the burner sufficiently to insure perfect vaporization. Another difficulty experienced in the use of such burners by others than experts is that, even after the burner is properly burning and is vaporizing, if the valve which controls the admission of the fluid or of the vapor after the temperature is sufficient to vaporize the fluid is opened too wide the vapor may be discharged and burned more rapidly than it can be generated in the generating-tube, causing an interval in the supply and resulting in the extinguishing of the light, followed by the flooding of the burner with the liquid. These difficulties we aim to overcome by providing from the supply-tube two ducts which lead to the burner-tip, in one of which is set a valve adapted to be adjusted therein to permit only the minimum quantity of vapor to pass it which will suffice to maintain a flame sufficiently intense to maintain the heat of the burner at a point which will vaporize the liquid, the other duct being controlled by a valve, which serves as the ordinary operating-valve and which may be fully closed, thereby limiting the supply of vapor to the amount which can pass the valve-seat, as described in the other duct, and which may be opened to a point which will admit sufficient vapor to maintain the maximum flame—that is, which will admit such amount of vapor as the burner is capable of generating and no more, a stop being provided to limit the opening of said operating-valve, the stop being adjustable at will, but being unaffected by the operation of the operating-valve, so that no amount of use of the operating-valve will cause it to open any wider or admit any more vapor past it than the amount determined by the adjustment of the stop. This burner is designed to remain permanently lighted, but controlled by the minimum valve when no light is required, being thereby kept burning, however, at the lowest possible point which will keep the burner hot enough to vaporize the fluid. In accomplishing the principal result sought, as above stated, we accomplish a further result by means of the particular form of operating-valve and stop chosen, as hereinafter pointed out—viz., that no packing of the stem and no stuffing-box therefore, in the ordinary sense, is required about such valve to prevent leaking around its stem when it is open.

In the drawings, A represents the supply-tube and vaporizing-chamber, which is filled with any suitable absorbent and porous substance A′ (asbestus fiber being a suitable and preferred substance for the purpose) which checks the flow of the fluid to the burner and retains the latter after the burner is lighted, causing the fluid which is conducted into it to be vaporized in its pores toward the upper part of said tube. This tube or stem is cast integral or brazed at the upper end to the burner proper B. The burner B comprises, in addition to its vertical portion, the horizontal cross-arm B′, which is provided to receive the valves, and, in addition, it has the perforated floor B^3, from which extends the annular wall B^4, said parts having functions hereinafter explained. From the supply-tube the duct *b* extends up into the burner B until it meets the horizontal duct *b′* in line with the center of the cross-arm B′. This duct may be primarily formed by drilling through the entire length of the cross-arm B′. From the top of the burner B there are then drilled down into the duct *b′* the parallel vertical ducts b^3 and b^4. From the end of the cross-arm B′ the hole drilled to form the duct *b* is slightly enlarged and threaded to receive the screw-valve C, which is made to screw tightly into the hole thus threaded, the screw fitting the hole so completely as to make it gas-tight. This valve C has a long taper and seats in the unenlarged portion of the duct *b*, thereby being adapted to cut off communication from said duct *b* to the duct b^4, which will be hereinafter referred to as the "minimum duct." In use the valve C will be withdrawn from its seat sufficiently to admit past the minimum quantity of vapor necessary to keep the burner hot, as hereinafter explained. From the other end of the cross-arm B′ the hole drilled for the duct *b* is enlarged to the duct b^3, said enlargement being threaded and of sufficient size to admit the exteriorly-threaded plug D, which is formed with a polygonal head and adapted to be operated by a wrench, and has screwed onto it before it is screwed into the cross-arm a set-nut D′. This plug D is axially drilled through from end to end, and the hole is interiorly threaded to admit the threaded stem E′ of the operating-valve E. This valve E is a short cylinder adapted to seat flatwise on a seat *e*, formed for it at the end of the enlargement of the drilled hole into which the plug D is screwed, as described, said seat encircling, therefore, the end of the duct *b* which at that point opens into the side of the duct b^3. The other side of the cylindrical valve E is adapted to seat flatwise also against the inner end of the plug D, which is ground to fit said valve snugly and gas-tight.

A suitable operating-handle is made fast at the outer end of the stem E′ after it has been screwed from the other end through the plug D before said plug and valve are to be inserted in the cross-arm B′, which is done by screwing the plug thereinto, as indicated.

The end of the burner B above the cross-arm B′ is exteriorly threaded to receive the burner-tip F. This burner-tip is of the nature of a cap interiorly threaded to adapt it to be screwed down onto the threaded end of said burner B, and chambered out above the threaded portion, forming the radial chamber F′, from which small horizontal holes called "jet-orifices" *f′* lead to the exterior surfaces, said jet-orifices being all in the same horizontal plane and of very small diameter, such as are commonly called "pin-holes." These orifices are represented in the drawings somewhat exaggerated as to size, it being impossible to represent them in their true proportion. They all extend radially with respect to the burner B and the tip F.

The floor B^3 of the burner is perforated on both sides of the cross-arm B′ to admit air into the chamber formed by the annular wall B^4, and said wall extends up to the level or a little above the level of the jet-orifices *f′*, and is flared at the upper end, and the flaring flange is convoluted, forming a depression B^{40} in line radially with each of the orifices *f′*, the intermediate elevations B^{41} of said convoluted flange being in line radially with the intervals between the jet-orifices, so that said depressions B^{40} constitute, substantially, apertures through the shield which said wall B^4 constitutes to protect the flame from extinguishment by draft and to steady it, said apertures permitting the jets of flame to extend out beyond the wall when the supply of vapor admitted is sufficient, the jets being, however, confined within the wall when the minimum valve only is open.

This burner is designed to be employed with a transparent globe or protecting-shield, which may be supported upon any suitable device which may be secured in place between the clamp-nut G and the shoulder G′, which are provided on the tube A below the burner proper. Such shield will sufficiently protect the minimum flame from extinguishment by any ordinary draft or movement of air past the globe or shield, and as to the effect of any such draft below the burner the minimum flame will be fully protected by the burner-floor B^3, the perforations therein being so small as to completely break up any current which might otherwise affect the flame. As to the effect of such a draft across the top of the globe, the tendency of such a draft to produce an upward current past the burner-tip is prevented by the burner-floor B^3, for the reason above stated. Any downward current upon the burner-tip produced by such draft is prevented from extinguishing the minimum flame by the form of the top surface of the burner-tip, which is, as illustrated, in the form of a very abrupt cone, whose inclination is such as to divert any downward current over the upper edge of the wall B^4—that is, a current striking downward upon the conical upper surface of the tip and being reflected by that surface cannot approach nearer to the

jets than such surface produced, and that surface produced would pass over the wall B^4, thus preventing any effect upon the minimum flame by reason of such draft.

Since it is desirable that the burner-tip should be capable of being very promptly heated by the flame, and therefore that it should contain the least possible metal in proportion to the surface exposed near the flame, it is cut away between the plane of the jet-orifices and the upper conical surface forming the recess F^2, below which there is only sufficient metal to make a proper wall for the cavity F', thus exposing the wall of said recess to the flame and heated air.

I claim—

1. In a vapor-burner, in combination with the fluid-supply pipe, the burner B, having the minimum duct b^4, and the valve C, limiting the opening thereinto, the maximum duct b^3, the threaded opening into said maximum duct, the plug D, and the valve-stem E', screwed through said plug from the inner end and provided with a handle at its outer end, and the valve E on the inner end of said stem, adapted to seat by its inner face over the aperture into the maximum duct and adapted to seat by its outer face against the inner end of the plug D, substantially as set forth.

2. In a vapor-burner, in combination with the fluid-supply pipe, the burner B, having the duct b', and the duct b, communicating from the supply-pipe through said duct b', and the ducts b^3 and b^4, communicating with said ducts b' transversely thereto, the valve C, seating endwise in the duct b' between the points of communication therewith of the ducts b and b^4, and the valve which controls the flow through the duct b^3, substantially as set forth.

3. In a vapor-burner, in combination with the fluid-supply pipe, the burner B, having the duct b', and the duct b communicating from the supply-pipe to said duct b', and the ducts b^3 and b^4 communicating with said duct b' transversely thereto, the valve C, seating endwise in the duct b' at one end thereof, the duct b' being enlarged at the end opposite the valve C, the plug D, screwed into such enlargement and having the valve-stem E' screwed through it from the inner end and provided with the handle at the outer end, and with the valve E at the inner end adapted to seat at the end of the unenlarged part of the duct b' opposite the valve C and to be stopped in the opposite direction by the plug D, substantially as set forth.

In testimony whereof we have hereunto set our hands, at Denver, Colorado, in the presence of two witnesses, this 11th day of April, 1890.

ISAAC E. BLAKE.
HERMAN RAUCHFUSS.

Witnesses:
CHAS. B. COWELL,
M. MCMULLIN.