(No Model.)

E. B. RAYMOND.

OIL VAPORIZER AND BURNER.

No. 514,870. Patented Feb. 13, 1894.

Fig. 1

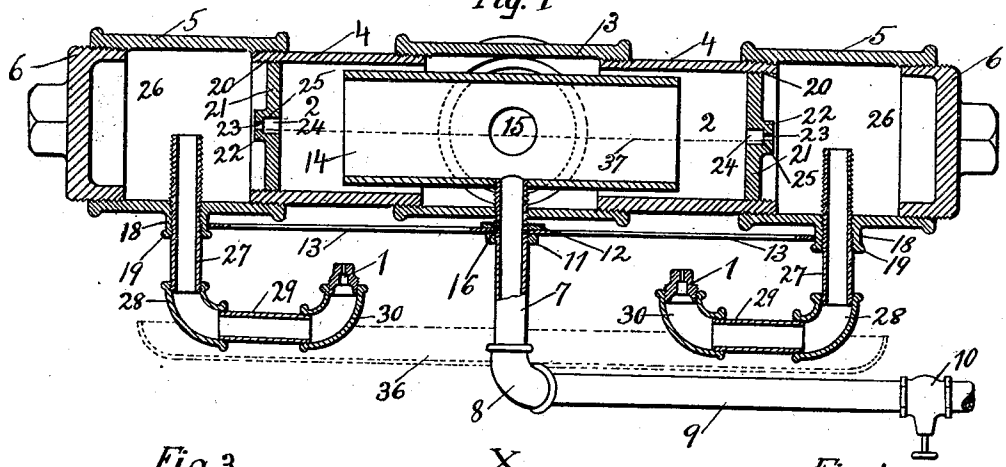

Fig. 3

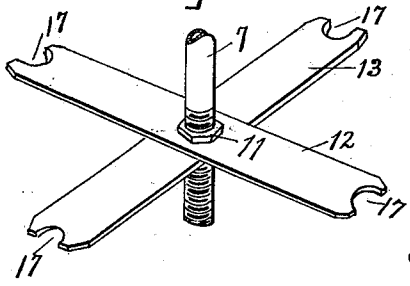

Fig. 4

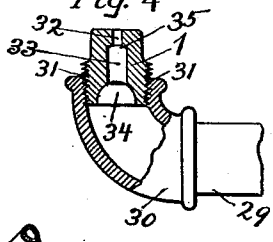

Fig. 2

Witnesses.

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UNITED STATES PATENT OFFICE.

EMMET B. RAYMOND, OF ST. LOUIS, MISSOURI, ASSIGNOR TO GUS SIEVERS AND A. R. LEE, OF SAME PLACE.

OIL VAPORIZER AND BURNER.

SPECIFICATION forming part of Letters Patent No. 514,870, dated February 13, 1894.

Application filed October 23, 1893. Serial No. 488,870. (No model.) Patented in Canada December 4, 1893, No. 44,812.

To all whom it may concern:

Be it known that I, EMMET B. RAYMOND, of St. Louis, State of Missouri, have invented certain new and useful Improvements in Oil Vaporizers and Burners, (patented in Canada December 4, 1893, No. 44,812,) of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to an improved oil vaporizer and burner, and consists in the novel construction, combination and arrangement of parts hereinafter described and designated in the claims.

The object of my invention is to provide a very compact, simple and inexpensive apparatus for burning crude petroleum and its lighter products for industrial and domestic purposes.

A further object of my invention is to provide improved means in burners of this class, for restricting the passage of vapor from the generating chamber to each burner exit orifice, whereby the vapor from the superheating chambers will flow to the said burner exit orifices in a steady stream, and from said exit orifices in a steady stream, thereby preventing, as far as possible, irregularities in the size and force of the streams of vapor discharged by said burner exit orifices.

A further object of my invention is to provide improved means for preventing the overheating of the generating and superheating chambers of the burner.

In the drawings: Figure 1 is a sectional side elevation of a burner constructed in accordance with my invention, the section being taken on the line *x*—*x* of Fig. 2. Fig. 2 is an inverted plan view of the burner. Fig. 3 is a detail view in perspective of the flame spreaders or shields, and a portion of the supply pipe to which they are attached, detached from the burner and inverted. Fig. 4 is a detail sectional elevation enlarged, of one of the burner exit nozzles, and its supporting parts.

Referring to the drawings, it will be observed that I have illustrated an improved burner having four separate exit nozzles 1, each supplied with vapor from a separate heating chamber connected to a single generating chamber common to all.

Before proceeding with a further elucidation of my invention, I desire to state that my improved burner may be constructed with but a single exit nozzle, superheating chamber and generating chamber in the manner hereinafter explained. The burner is preferably constructed of pipes and fittings that are circular in cross-section, as herein shown.

2 represents the generating chamber, formed of a coupling 3 that is substantially cross-shaped in plan view into each of the four branches of which short pieces of pipes 4 are threaded, and threaded upon the outer end of each of said pipes is a T-coupling 5, having a common plug 6 threaded into its outer end.

7 indicates the vertical portion of the supply pipe, the upper end of which is connected to the generating chamber, and the lower end of which is provided with a common elbow 8, and a length of pipe 9.

The burner is to be placed in a fire-box or combustion chamber of a stove or furnace in the usual manner, and the pipe 9 is to be supplied with any common form of valve 10, whereby the supply of oil to the burner may be regulated.

The upper portion of the supply pipe 7 is provided with screw-threads extending a considerable distance from its upper end downward, and mounted upon this threaded portion is a threaded nut 11 and two spreaders or shields 12 and 13, and the upper end of said pipe is threaded into the lower side of the cross-shaped coupling 3, and its upper terminal projects a distance upon the interior thereof.

Mounted upon the inner projecting end of the pipe 7, within the cross-shaped coupling, is a short horizontal supply and sediment collecting tube 14, so that the opposite ends of said tube project a distance within the opposite short pipes 4, and so that the outer periphery of said tube 14 is held at all points out of contact with the adjacent walls of said short pipes 4, thereby leaving a clear annular space surrounding said tube for a purpose

hereinafter mentioned. The upper end of the supply pipe 7 is threaded into an aperture formed in said horizontal tube 14. Said tube 14 is supported in position solely by said supply pipe. The upper end of the supply pipe 7 is preferably flush with the inner surface of said tube 14. A hole or aperture 15 is formed in the tube 14 at a point opposite the remaining two short pipes 4, which are connected to said cross-shaped coupling 3, for a purpose hereinafter mentioned.

It will be observed that the spreaders or shields 12 and 13 are superposed, and may be securely clamped in position against the under side of the cross-shaped coupling 3 by means of the nut 11. The said spreaders are provided with vertically aligned apertures 16 which are engaged by said supply pipe 7. Said spreaders cross each other and are secured together by means of said nut. The outer ends of the spreaders are provided with semi-circular notches or recesses 17, which engage depending nipples or tubular projections 18 upon the under side of the T-couplings 5. These projections have annular flanges or projections 19 at or adjacent their lower terminals, and the spreaders 13 engage said nipples at points intermediate of said annular projections and the lower side of said T-couplings. By this construction the outer ends of said spreaders are securely supported in position and prevented from sagging during operation. The spreaders 12 and 13 also act as shields to prevent overheating of the generating and superheating chambers of the burner, and should therefore be made of some non-combustible material which will not fuse when subjected to the heat of the burner. I have found that pieces of sheet steel or iron of the proper thickness afford very satisfactory results in this particular, providing the temperature is kept within reasonable bounds. By the above construction, I thus provide a series of detachable spreaders or shields beneath the generating and superheating chambers, and each having a support at its outer end in addition to the support located beneath the cross-shaped coupling 3.

The outer end of each short pipe 4 is provided with internal screw-threads 20 and a detachable partition 21 is provided with peripheral screw-threads, and located within each of said short pipes with its screw-threads in engagement with the internal threads thereof. This partition is in the form of a flat disk, having upon its outer side a centrally projecting integral nozzle 22, having a central restricted orifice 23, and upon its opposite side said partition is provided with a central cavity or recess 24 that is larger in cross-section than said restricted orifice. The inner end of the cavity 24 terminates in an abrupt shoulder 25 surrounding the inner end of said restricted orifice 23. The inner end of said orifice 23 communicates with the cavity or recess 24.

The location of the partitions 21, as herein shown, provides a separate superheating chamber 26 at the outer end of each short pipe 4, and each in communication with the common generating chamber 2 by way of a restricted orifice 23.

Projecting upward within each superheating chamber 26 to a point some distance above the plane of the bottom of the horizontal tube 14, and a slight distance below the plane in which the restricted orifice 23 is located, is a small vertical tube 27.

As the construction and connections of each superheating chamber are identical, I will limit my description to one of them. The tube 27 is screw-threaded upon its outer surface from its upper end to a point at about midway of its length, and is threaded within the nipple 18 so that its lower end projects a distance below said nipple. Threaded upon this lower end is a common elbow 28, and engaging this elbow is a short horizontal pipe 29. This horizontal pipe 29 is turned inward, so that it projects beneath the superheating and generating chambers, and extends substantially parallel therewith. Threaded upon the inner end of said pipe 29 is another common elbow 30, and detachably threaded in this elbow is an exit nozzle 1, so that said exit nozzle is located beneath one of the spreaders or shields, and beneath a portion of the generating chamber and arranged to discharge a jet of vapor upward into contact with said spreader or shield.

As I consider the specific construction of the exit nozzle 1 to be of importance, I will now describe the same. Said nozzle is preferably made in the form of a plug having a tapered screw-threaded portion 31, which forms a tight-joint with the elbow 30 without packing. Formed in the upper end of this plug is a restricted vertical discharge orifice or passage 32, terminating at its lower end in a longitudinal bore or recess 33 that is considerably larger in cross-section than the orifice 32, and this bore or recess terminates at its lower end in a still larger recess 34. By the above construction an abrupt annular shoulder 35 is made to surround the lower end of the said orifice, so that said orifice is formed in a comparatively thin horizontal body of metal, for a purpose hereinafter mentioned. The discharge orifice 23 in the nozzle 22 of the partitions 21 should not be larger, and is preferably smaller than the discharge orifice 32 of the exit nozzles 1.

The operation is as follows: A small quantity of suitable inflammable liquid is permitted to run into the lighting-pan 36 (indicated by dotted lines in Fig. 1), and lighted. This liquid burns until the generating chamber 2 and the superheating chambers 26, and contiguous parts, are thoroughly heated. The regulating valve 10 is now to be opened, permitting oil to flow by way of the supply pipe 7 into the horizontal tube 14, whence it flows

into the generating chamber 2 by way of the opposite open ends of said tube and accumulates in said generating chamber and in said tube, until it reaches a height indicated by the dotted line 37, as shown in Fig. 1, when the overflow passes through the restricted openings 23 of the partitions 21 into the superheating chamber. Under some conditions this overflow of oil into the superheating chambers will take place, while under other conditions it will not. When it does, however, the oil will accumulate in said superheating chambers to a point on a level with the plane of the upper open end of the vertical pipes and tubes 27. The oil contained in said generating chamber, and in said superheating chambers, will be vaporized by contact with the highly heated surfaces thereof, and pass in the form of vapor downward through the pipes 27, elbows 28, short horizontal pipes 29 and elbows 30 to the exit nozzles 1. The vapor escaping at the orifice 32 should then be lighted. The flame from the exit nozzles is thrown upward forcibly against the under side of the spreaders or shields 12 and 13, and is thereby thrown laterally, and thence passes upward in contact with and around opposite sides of said generating and superheating chambers. The supply of oil to the burner should be restricted within the generating capacity thereof so as not to overcrowd it, and if this is done it will be found that only vapor will pass from the generating chamber 2 into the superheating chambers, and the results will be very satisfactory, said superheating chambers acting to thoroughly superheat the vapor contained therein and discharge a perfectly dry gas to the exit nozzles, in the manner previously mentioned.

In burning cruder varieties of oil, the horizontal tube 14 acts to collect the greater quantity of sediment and impurities upon its inner surface, from which said impurities may be readily removed by detaching the adjacent end plugs 6 and partitions 21, or by detaching the adjacent pipe 4, and the parts carried thereby, from the cross-shaped coupling 3. I have found that the spreaders or shields 12 and 13 not only act to spread the flame and protect the generating and superheating chambers from a too intense heat, but they also act as spreaders to throw the flame out laterally upon each side of the burner in the form of lateral bodies of flame, thereby bringing the discharged vapor and flame more intimately in contact with the air, and causing a more perfect combustion than would otherwise be had.

I find that under normal conditions my improved burner operates without producing any appreciable quantity of smoke. It is practically smokeless after it is well under way.

Heretofore in hydrocarbon-burners, much trouble has been experienced during operation by reason of the sediment and impurities of the oil passing from the generating chamber to the exit orifices, and clogging the same. This has been caused mainly, by reason of the fact that no separate detachable exit nozzles were employed, and by reason of the further fact that in the majority of cases the discharge openings were simply drilled in the side of the burner pipe by means of a common drill, and this has caused a rough burr or projection upon the interior of said pipe, which has acted as a sort of strainer or obstruction for the oil and sediment, and such sediment has collected around and in said discharge openings and accumulated from time to time until said openings have been completely stopped.

The insertion of a pin, small wire, or other device, for the purpose of cleaning the discharge openings of burners constructed in the manner just named, has afforded but temporary relief, for the openings have rapidly filled up again upon the withdrawal of such pin or other device.

In my improved exit nozzle, should sediment in the exit orifice 32 accumulate, it may be readily dislodged and forced downward into the enlarged recess 33 by the simple insertion of a common pin or small wire, thereby leaving the said nozzle orifice in a clear condition.

By reason of the restricted discharge orifice 23 in the partitions 21, I have found that the discharge of vapor to the superheating chambers, and to the exit nozzles 1, is limited to the capacity of said exit nozzles, so that only such a limited volume of vapor can be discharged into superheating chambers as can readily pass to the atmosphere by way of the discharge orifice 32 of said exit nozzles 1, and with the result that each jet or flame will burn very steadily and irregularities or fluctuations in the size thereof during operation is prevented.

What I claim is—

1. In a burner, the generating chamber 2, having within it a horizontal supply and sediment collecting tube 14, the opposite ends of which are open, in combination with an oil supply pipe projecting within said chamber and communicating with and supporting said tube 14, substantially as herein specified.

2. In a burner, a generating chamber, superheating chambers, located on opposite sides of a supply pipe connection and formed of T-couplings 5 having nipples 18 upon their lower sides, said nipples having annular projections 19, adjacent their lower ends, exit nozzles connected to said nipples so as to discharge flame upward beneath said chambers and the spreaders 12, 13 having terminal recesses 17 engaging said nipples, and supported intermediate of their ends by the oil supply pipe of the burner, substantially as herein specified.

3. In an oil vaporizer and burner, the combination of the generating chamber, a super-

heating chamber, a burner supported by said superheating chamber and adapted to heat both chambers, a detachable partition 21, provided with peripheral screw threads, and on its outer side with a centrally projecting integral nozzle 22, having a centrally restricted orifice 23, and upon its opposite side with a central cavity or recess 24, that is larger in cross section than said restricted orifice, substantially as herein specified.

In testimony whereof I affix my signature in presence of two witnesses.

EMMET B. RAYMOND.

Witnesses:
E. E. LONGAN,
JNO. C. HIGDON.