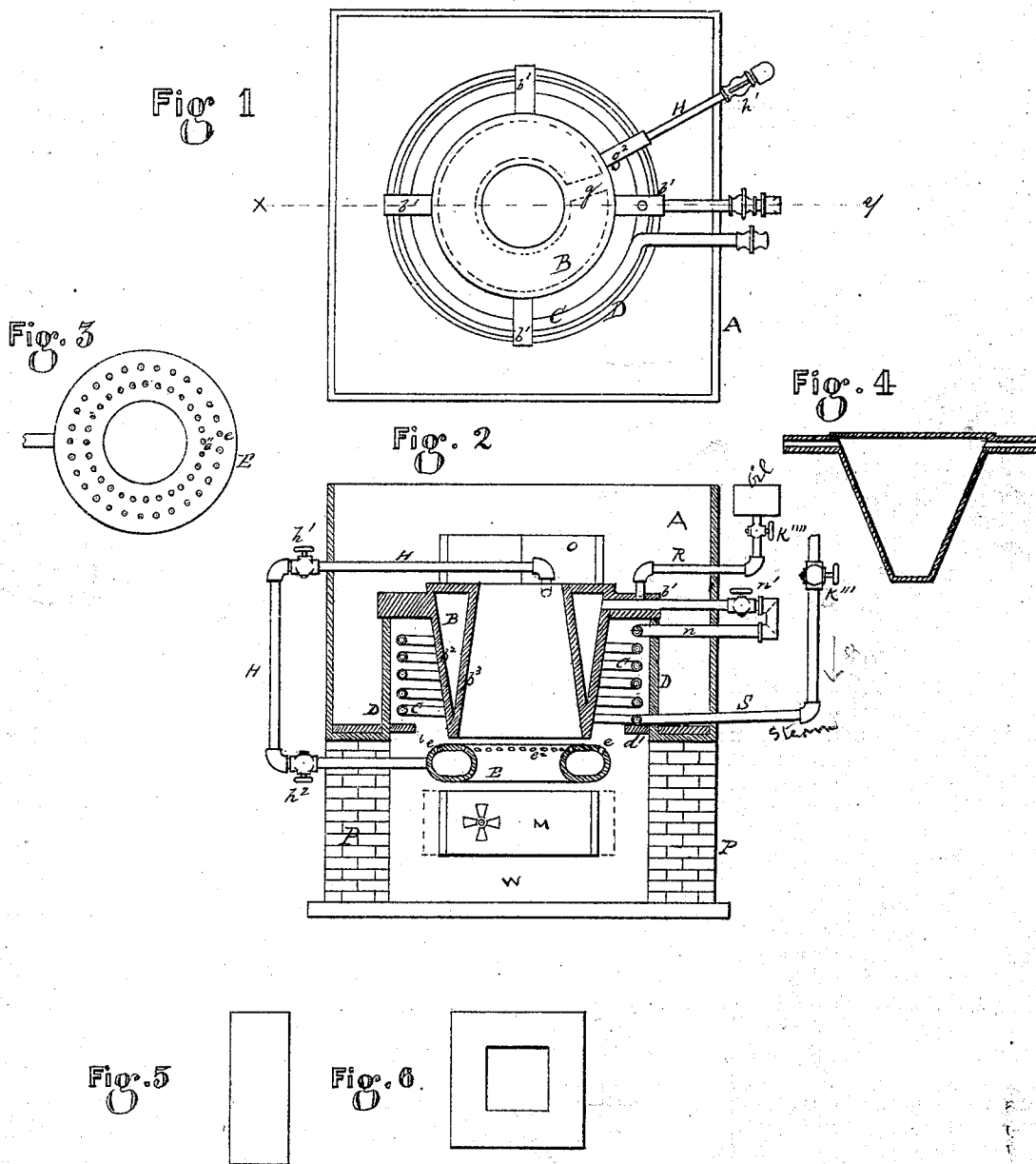


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Improvement in Apparatus for Burning Hydro-Carbons.

No. 123,109.

Patented Jan. 30, 1872.



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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN APPARATUS FOR BURNING HYDROCARBONS.

Specification forming part of Letters Patent No. 123,109, dated January 30, 1872.

SPECIFICATION.

Specification describing certain Improvements in the "Mode of Burning Hydrocarbons as Fuel or for Illumination," invented by ISAAC KENDRICK, of the city and county of Philadelphia and State of Pennsylvania, the said invention being an improvement on my patent of November 8, 1870, No. 109,131.

The nature of my invention consists in the construction of the furnace for vaporizing oils of creosote, shale, petroleum and its products, and burning the same, in combination with superheated or decomposed steam, as fuel and for illumination.

Figure 1 is a plan of my apparatus. Fig. 2 is a vertical section of Fig. 1 on the line *x y*. Fig. 3 is a plan of the burner. Figs. 4, 5, and 6 are modified forms of generator B.

A is the wall of the fire-box or furnace; or, in case of a locomotive, it is the inside plate of the fire-box. W is the draught-chamber, usually the ash-pit. M is the door of the draught-chamber. O is the fire-door. B is a double-walled cylinder, of iron or other metal, the sides of which form an inverted cone in shape; or it may be otherwise, as preferred. The ends of the cylinder between the walls *b²* and *b³* I close tightly, thereby forming a close chamber between the two walls leaving the center open throughout. This cylinder B I term the gas or vapor generator of hydrocarbons. It has four hollow lugs cast on it, *b¹*, by which it is supported upon a cylinder, D, of iron or other metal or fire-brick placed around and outside of it, leaving such space between the two as may be required for placing therein a coil of pipe, C. This cylinder D, when in position, is made to rest upon the top of the brick-work P, which forms the draught-chamber, (usually the ash-pit.) When applied to locomotives or portable engines it is supported on a bed-plate or lugs at about the level usually occupied by the fire-bars. This cylinder D is for the purpose of directing and confining the flame from the burner E against the walls of cylinder B and up through and over the coil or rings C. C is a coil of iron pipe or other metal; or it may be one or more hollow metal rings resting upon and opening into each other. It rests upon pins or lugs *d'* projecting from the bottom of the cylinder D. The coils are separated from

each other and from the cylinder D by a small space which permits the flame to encircle the rings of the coil. E, the burner, is a hollow ring or tube, of iron or other metal, with inserted nipples or drill-holes on its upper side, as shown plainly in Fig. 3, the same being capped or circled with resisting metal to prevent expansion or closing by intense heat. This burner I place immediately below and in close proximity to cylinders B and D and coil C, and connect by a pipe with cylinder B. The inside row of holes *e''*, (see Fig. 3,) directs the jet of flame inside of cylinder B. The outside row directs the flame up the annular space and over the coil of pipe between the retort B and cylinder D. S is a pipe conveying steam from the boiler into the lower end of the coil C. The steam is regulated by cock *k'''*. The decomposed steam leaves the coil at the top by the pipe *n*, passing through the stop-cock *n'* and through the hollow lug *b¹* into the retort B. The pipe R leads from a tank and conveys the hydrocarbons into the retort B, the quantity being regulated by the cock *k''''*. It enters the passageway of the lug *b¹* at right angles, so that the force of the current of the entering steam shall drive in the hydrocarbon liquid with it, thus obviating the necessity of a force-pump or an elevated supply-tank. There are various devices at present in use for impelling air and water by the force of steam, which may be more efficient, and I do not confine myself to the exact device shown. The retort B has a dividing-plate, *g*, shown in dotted lines, so situated as to cause the mixed steam and petroleum vapor to make the entire passage around the retort and out at the lug *g²* by the pipe H to the burner. The pipe H has a regulating-cock, *h¹*, and also a two-way cock, *h²*. This latter one, *h²*, is used for the purpose of blowing off any residuum which may collect in the cylinder B. It is not essential, although preferred, that the cylinder B should be circular, as shown in Fig. 2. It may be octagonal, hexagonal, polygonal, rectangular, or square in form, with or without the central opening, as in Figs. 4, 5, and 6, the burner E, the coil C, and cylinder D being made to conform in shape.

The object of my invention is of a twofold purpose, namely: To burn hydrocarbon liquids economically as fuel, as also to make at a low

cost a permanent or fixed gas for illumination, both of which I accomplish by the use of my apparatus, by preparing and burning with the gas or vapors of hydrocarbons superheated or decomposed steam.

The difficulties heretofore experienced in the use of petroleum and its products as a fuel or in making therefrom a permanent or fixed gas for illumination result from the excess of carbon—or, rather, a deficiency of hydrogen therein—and perfect combustion was unattainable; therefore, in order to overcome this difficulty, it became absolutely necessary that this excess of carbon must be got rid of, (at a great loss,) or the equivalent of hydrogen (naturally deficient in the oil) necessary to a perfect combustion must be supplied from some other source. This I claim to do in a large and sufficient degree by the use of my coil or rings C, which, being heated by the flame from burner E to a very high temperature, (red heat,) decomposes the steam passing through and sets free its hydrogen, which I secure, mix, and combine, under intense heat, with the gas or vapors of the hydrocarbons in the retort B, and, together, use as fuel and for illumination.

The mode of working the apparatus is in this manner: A temporary fire is built within the draught-chamber W to heat the cylinder B. When sufficiently heated to generate gas the cock k^4 is opened for the oil or liquids to flow into chamber B from a reservoir. Steam is then admitted from the steam-space of a boiler through pipe S, regulated by cock k^3 , into coil C, where it is subjected to an intense heat and decomposed. From thence it passes through pipe n into the chamber of cylinder B, where it is mixed or combined with the gas or vapors of the hydrocarbons under a high degree of temperature, and together pass around retort B and out at g^2 , through pipe H, to the burner.

When the apparatus is employed for making illuminating-gas it is preferred to reverse the

order and admit the steam and petroleum first into the retort B, where, under intense heat, they are decomposed and combined, and together pass through the coil C, and issue as a fixed gas to a burner or gas-holder. In this arrangement the flame from the burner E is made to pass up through the central opening of cylinder B, and also the annular space between the retort B and wall D around the coil C, and thence to the steam-boiler or other object for which heat may be required, the same flame accomplishing all the purposes desired.

Steam, I am aware, has been used to a considerable extent, in connection with petroleum, as fuel, but not in the manner and form herein described.

I claim as my invention—

1. The arrangement of the coil C within the annular space between the wall D and cylinder B, and operating in conjunction therewith, as herein described.

2. The burner E, arranged beneath the cylinder B and coil C so that the flame is made to bear upon and completely surround the said cylinder and coil, for the purposes herein described.

3. The combination and arrangement of the coil C, the pipe n for connecting the coil with the retort B, and the oil-inlet pipe R, operating as herein described.

4. I claim the dividing-plate g within the cylinder B, so as to compel the combined steam and hydrocarbon to make the circuit of the cylinder to the outlet g^2 , as herein described.

5. The gas-generator B, the cylinder D, and coil C and burner E, combined and operating in connection, as and for the purpose herein set forth.

I. KENDRICK.

Witnesses:

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