

No. 635,624.

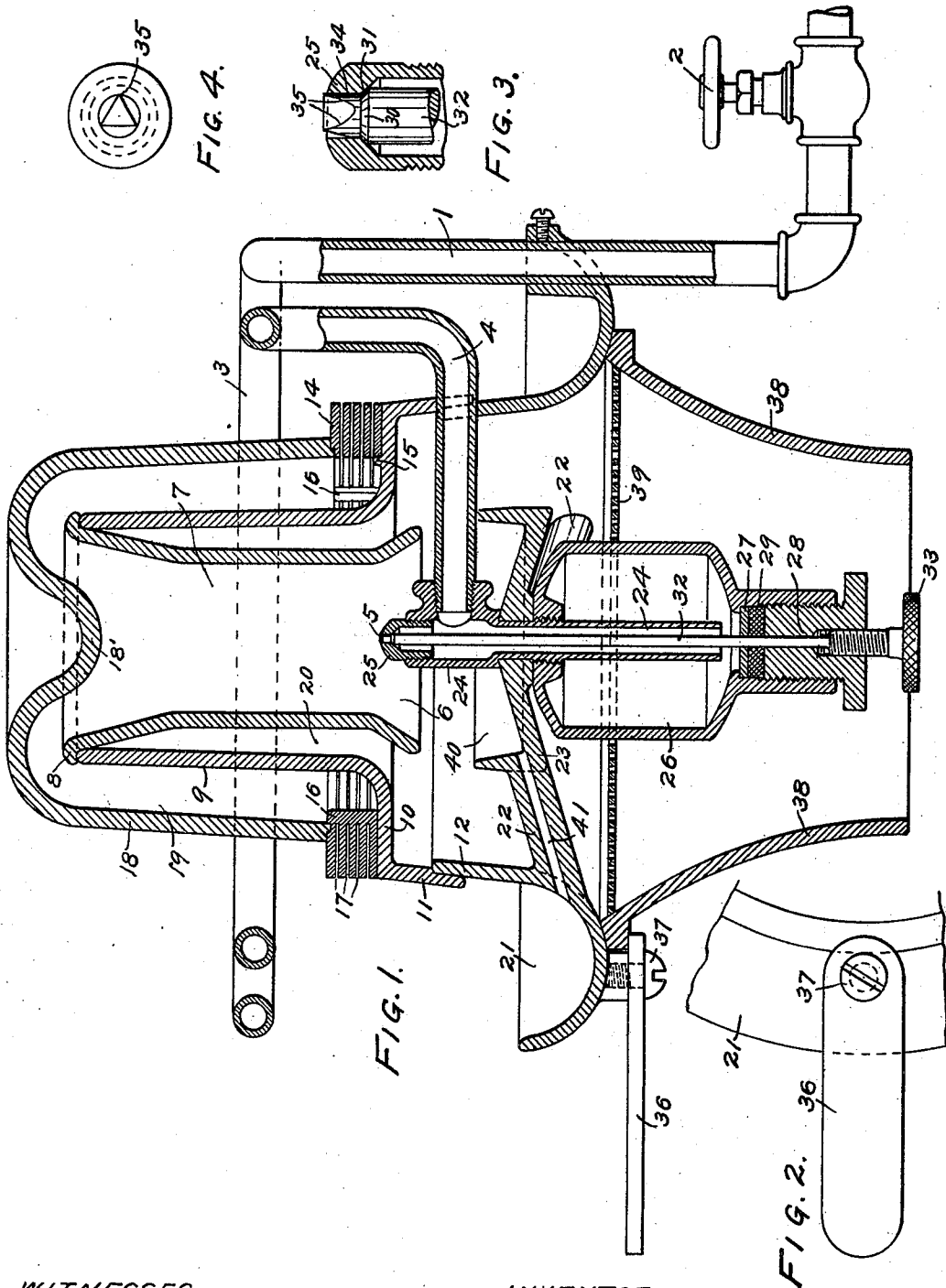
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J. W. WEEKS.

GAS OR VAPOR GENERATOR AND BURNER.

(Application filed June 25, 1898.)

(No Model.)



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GAS OR VAPOR GENERATOR AND BURNER.

SPECIFICATION forming part of Letters Patent No. 635,624, dated October 24, 1899.

Application filed June 25, 1898. Serial No. 684,499. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. WEEKS, of the city and county of Providence, in the State of Rhode Island, have invented certain new and
5 useful Improvements in Gas or Vapor Generators and Burners; and I do hereby declare the following specification, taken in connection with the accompanying drawings, forming a part of the same, to be a full, clear, and
10 exact description thereof.

The invention relates more especially to that class of gas or vapor burners in which the gas or vapor is generated by the heat from the burner acting upon a liquid fed to a gener-
15 ating-retort and in which the gas or vapor thus generated is intermingled with air and the intermingled air and gas or vapor fed to the burner, although certain features of the invention are applicable to other forms of
20 burners.

One object of the invention is to provide a burner of the class referred to in which there is a thorough intermingling of the air and gas or vapor and in which there is an active and
25 continuous flow of the intermingled air and gas or vapor through the mixing-chamber and throughout the passage from said chamber to the exit-orifices, so that there may be no dead-spaces in said passages, in which
30 there is little or no movement of the air and gas or vapor.

A further object is to provide means for tempering the air and gas or vapor in the mixing-chamber, and this is accomplished by
35 providing an air-space about the mixing-chamber.

A further object is to provide means for preventing a pulsating flow of gas or vapor through the discharge-orifice, due to sudden
40 changes in the amount of gas or vapor generated.

To these ends and to the end that a burner may be provided which is simple in construction and efficient and economical in action
45 the invention consists in the features and combinations hereinafter set forth in the claims.

In the drawings, Figure 1 is a vertical sectional view showing all the various features
50 of invention in their preferred forms embodied in a single burner. Fig. 2 is a detail view of

the supporting means, and Figs. 3 and 4 are details of the discharge-orifice for the gas or vapor and the valve therefor.

Referring to the drawings in detail, 1 represents the supply-pipe, which leads from a
55 source of liquid-supply and is provided with a valve 2. The supply-pipe leads to a ring or coil 3, which forms a retort or chamber in which the gas or vapor is generated. A pipe 4
60 leads from the generating chamber or retort to the orifice 5, through which the gas or vapor generated in the retort is discharged. The discharge-orifice 5 is located within the inlet end 6 of a mixing-chamber formed by a throat-
65 piece 7, which is provided at its upper edge with a flange 8, which rests upon the upper edge of a cylinder 9 and supports said throat-piece. The cylinder 9 is provided at its lower
70 end with a horizontal flange 10, at the outer edge of which is a depending rim 11, which rests upon and fits over a cylindrical rim 12, forming a part of the base-piece of the burner. A ring 14 is held in place upon the flange 10
75 by lugs 15, and said ring is provided with ribs 16 upon its inner surface. A series of horizontal slits 17 extend through said ring and form exit-orifices at which the mingled air and gas or vapor is ignited and burns. A cap or hood 18 rests upon the ring 14 and
80 incloses the cylinder 9, thus forming an annular passage 19 from the mixing-chamber to the exit-orifices 17.

When the burner is in operation, the mingled air and gas or vapor issues from the orifices 17, and thus burns directly below the
85 ring or coil 3, subjecting the liquid in said ring to a high temperature, which volatilizes said liquid. The gas or vapor thus generated escaping through the orifice 5 draws in air
90 through the lower end of the mixing-chamber, and said air and gas or vapor are thoroughly intermingled and flow over the upper edge of the throat-piece 7 and through the passage 19 to the orifices 17. In order that there may
95 be a rapid flow of gas or vapor and air through the mixing-chamber and a more thorough intermingling of the air and gas or vapor, it is preferred to provide the mixing-chamber with straight walls for a distance above the orifice
100 5 and to flare the walls of said chamber outward at the upper end.

In order to create an active and steady flow of the intermingled air and gas or vapor throughout the space between the mixing-chamber and the exit-orifices, so that there may be no dead-spaces where the gas or vapor and air may remain stationary or spaces where eddies may form, tending to retard the flow and cause lighting back, it is preferred to provide the hood 18 with a conical depression or inverted dome 18', which projects down within the mixing-chamber and forms a deflector for directing the intermingled gas or vapor and air over the upper edge of the throat-piece 7 and into the annular passage 19. The inverted dome of the hood also fills what would otherwise be a dead-space, in which there would be little or no flow of the gas or vapor and air. The upper edge of the hood is also curved and the parts preferably so proportioned that the cross-sectional area of the passage from the mixing-chamber to the exit-orifices is substantially constant and is substantially the same as the cross-sectional area of the mixing-chamber.

Owing to the shape of the throat-piece and cylinder 9 an air-space 20 is formed about the mixing-chamber, which forms one of the features of the present invention, which feature is not dependent upon the particular form of mixing-chamber used, but may be used with advantage in burners which do not embody the other features of invention. This air-chamber tends to temper the gas or vapor and air in the mixing-chamber and prevent too high a temperature in said chamber. By locating the air-chamber between the mixing-chamber and the passage leading to the exit-orifices the intermingled gas or vapor and air in said passage are also tempered and the liability to light back thereby lessened. A further advantage incident to the special construction shown, in which the air-space about the mixing-chamber is open adjacent to the entrance end of the mixing-chamber, is that the air is gradually drawn from said space into said chamber and tempers the air which mingles with the gas or vapor. A further advantage of this air-space is that it deadens the sound made by the gas or vapor escaping from the orifice 5, making the burner more nearly noiseless.

The base-piece curves outward and upward from the rim 12 to form an annular lighting-trough 21, which is located directly under the ring or coil 3 and below the orifices 17 and is substantially concentric with said ring. A series of radial arms 22 extend inward from the rim 12 and support a central hub or boss 23, in which is mounted a tube 24. The orifice 5 is formed in a plug 25, screwed into the upper end of the tube 24, and the pipe 4 leads into said tube near its upper end.

In order to insure an even flow of gas or vapor through the orifice 5, a regulating-chamber is connected with the passage leading from the generating retort or chamber to said orifice, in which chamber an air-cushion

is formed which will yield and relieve any sudden increase in pressure in said passage due to the too rapid generation of gas or vapor. The preferred construction and arrangement of this regulating-chamber are as follows: The tube 24 extends down below the boss 23 nearly to the bottom of a chamber 26 and forms a passage from the conduit 4 to said chamber. The chamber 26 is supported by the tube 24. The bottom of the chamber 26 is closed by a plate 27, held in place by a screw-plug 28, a packing 29 being interposed between the plug and plate. The liquid rises in the chamber 26 until it covers the end of the tube 24, thus confining the air or gas above said liquid. Should there be a sudden increase in pressure in the pipe 4 or tube 24, the confined air or gas will yield, thus relieving the pressure at the orifice and preventing any tendency to a pulsating flow of gas or vapor through said orifice. By thus connecting the regulating-chamber with the passage from the generating-retort to the discharge-orifice the air-cushion therein is rendered more effective and the flow of gas is more even and steady than would otherwise be the case.

In order to regulate or stop the flow of gas or vapor through the discharge-orifice, a valve 30 is arranged to seat upon a conical valve-seat 31, formed in the plug 25. This valve is on the end of a rod 32, which extends down through the tube 24, chamber 26, and plug 28, said rod being screw-threaded in the plug 28, so that by turning the rod the valve may be adjusted. A hand-wheel 33 is secured to the lower end of the valve-rod for turning and adjusting the same. By thus passing the valve-rod down through the chamber 26 the overheating of said rod is prevented by the liquid in said chamber.

During the operation of the burner particles of carbon or impurities are liable to collect in the discharge-orifice 5 and interfere with the proper flow of the gas or vapor. It is preferred, therefore, to provide the end of the valve-rod with means for cleaning the orifice 5 and keeping said orifice clear, and this means preferably consists of one or more scrapers formed on the end of the valve-rod, which scrapers move over the surface of the orifice when the valve-rod is turned to adjust the valve. As shown, the end of the valve is provided with an extension 34, which fits within the orifice 5 and is beveled off at any number of points to form an angular projection, the edges 35 of which form the scrapers for cleaning the orifice. Other forms of scrapers may be formed upon or secured to the end of the valve-rod; but the form shown is preferred, as the angular projection not only serves to keep the discharge-orifice clear, but also serves to center and guide the valve-rod.

The base of the burner is provided with a series of supporting-arms 36, which are pivoted to the base-plate and may be clamped in position by screws 37. In case the burner is

to be used within a stove or other casing the arms 36 may be adjusted to fit the size of the stove or casing. The arms 36 serve also to secure a downward extension 38 to the base.

5 This downward extension is funnel-shaped and serves to protect the mixing-chamber from sudden drafts and is of especial advantage when the burner is to be operated in the open air. To further protect the mixing-chamber
10 and to prevent too rapid ingress of air to the mixing-chamber, a perforated plate 39 may be located across the top of the extension 38. This plate also serves to protect the chamber 26 from the heat and causes the air to be tem-
15 pered somewhat before entering the mixing-chamber and becoming intermingled with the hot gas or vapor. The central hub or boss 23 is provided with a tray 40, which surrounds the tube 24 and communicates with the light-
20 ing-trough 21 through passages 41, formed in the arms 22.

When the burner is to be started, the valves 2 and 30 are opened, and the liquid flows from the orifice 5 into the tray 23 and through
25 the passages 41 into trough 21, in which asbestos is placed and where the liquid is ignited. The liquid also flows into chamber 26 until the end of pipe 24 is covered, thus confin-
30 ing the air in said chamber. Any liquid which may pass up through the mixing-chamber will either flow back and drip into the tray 40 or will pass out of the orifices 17 and drip into the trough 21. By locating the
35 lighting-trough under and substantially concentric with the ring 3 the heat from the burning liquid in said trough is effectively applied to said ring and the gas or vapor quickly generated. When the gas or vapor is
40 generated, the intermingled gas or vapor and air issues from the orifices 17 and is ignited from the burning liquid in trough 21, and the burner continues in operation until the valve 2 is closed.

What I claim as my invention, and desire
45 to secure by Letters Patent, is—

1. In a gas or vapor burner, the combination with a discharge-orifice for the gas or vapor, of a mixing-chamber in which the gas or
50 vapor is intermixed with air, said chamber having straight walls above the discharge-orifice and outwardly-flaring walls at its exit end, a deflector extending within said exit end, exit-orifices where the intermingled air and gas or vapor is ignited, and a passage
55 from the exit end of the mixing-chamber to said exit-orifices, substantially as described.

2. In a gas or vapor burner, the combination with a discharge-orifice for the gas or vapor, of a mixing-chamber in which the gas or
60 vapor is intermixed with air, said chamber having outwardly-flaring walls at its exit end, a hood inclosing said chamber provided with an inverted dome extending down within said chamber, and exit-orifices at the base of said
65 hood where the intermingled gas or vapor is ignited, substantially as described.

3. In a gas or vapor burner, the combination with a discharge-orifice for the gas or vapor, of a mixing-chamber in which the gas or
70 vapor is intermixed with air, said chamber having straight walls above the discharge-orifice and outwardly-flaring walls at its exit end, exit-orifices where the intermingled air and gas or vapor is ignited, and an annular passage from the mixing-chamber to the exit-
75 orifices, substantially as described.

4. In a gas or vapor burner the combination with a discharge-orifice for the gas or vapor, a cylindrical mixing-chamber above said
80 orifice, exit-orifices where the intermingled air and gas or vapor is burned, and a passage from said chamber to said orifices, the cross-sectional area of said passage being substantially constant and equal to the cross-sectional
85 area of said mixing-chamber, substantially as described.

5. In a gas or vapor burner, the combination with a discharge-orifice for the gas or vapor, of a mixing-chamber in which the gas or
90 vapor is intermixed with air, said chamber having outwardly-flaring walls at its exit end, a hood inclosing said chamber provided with a curved upper edge and an inverted dome extending down within the exit end of said
95 mixing-chamber, and exit-orifices at the base of said hood where the intermingled gas or vapor and air is ignited, substantially as described.

6. In a gas or vapor burner, the combination with a discharge-orifice for the gas or va-
100 por, of a mixing-chamber in which the gas or vapor is intermixed with air, an air-chamber surrounding said mixing-chamber, exit-orifices where the intermingled gas or vapor and air is ignited, and a passage from said mix-
105 ing-chamber to said exit-orifices, substantially as described.

7. In a gas or vapor burner, the combination with a discharge-orifice for the gas or
110 vapor, of a mixing-chamber, exit-orifices, a passage from the mixing-chamber to said exit-orifices, and an air-chamber between said mixing-chamber and passage, substantially as described.

8. In a gas or vapor burner, the combina-
115 tion with a discharge-orifice for the gas or vapor, of a mixing-chamber in which the gas or vapor is intermixed with air, an air-chamber surrounding said mixing-chamber open adjacent to the entrance of the mixing-chamber,
120 exit-orifices where the intermingled gas or vapor and air is ignited, and a passage from the mixing-chamber to said exit-orifices, substantially as described.

9. In a gas or vapor burner, the combina-
125 tion with a discharge-orifice for the gas or vapor, of a throat-piece having flaring walls at its upper end, a cylinder surrounding said throat-piece and having its upper end closed thereby, a hood inclosing said cylinder, and discharge-
130 orifices at the base of said hood, substantially as described.

10. In a gas or vapor burner, the combination with a discharge-orifice for the gas or vapor, of a throat-piece having straight walls flaring at the upper end, a cylinder surrounding said throat-piece provided with a horizontal flange at its lower end, a hood inclosing said cylinder and supported from said flange, and exit-orifices at the base of said hood, substantially as described.

11. In a gas or vapor burner, the combination with a discharge-orifice for the gas or vapor, of a mixing-chamber, a depending funnel below said chamber and said discharge-orifice having its walls converging toward the lower end, and a perforated plate extending across the upper end of said funnel below the discharge-orifice, substantially as described.

12. In a gas or vapor burner, the combination with a generating-retort, of a discharge-orifice for the gas or vapor, a conduit from said retort to said discharge-orifice, a regulating-chamber, and a passage from said conduit to said chamber forming the only communication with said chamber and arranged to be sealed by a liquid, whereby the air or gas in said chamber is confined and forms a cushion, substantially as described.

13. In a gas or vapor burner, the combination with a generating-retort, of a discharge-orifice for the gas or vapor, a conduit from said retort to said orifice, a regulating-chamber, and a passage from said conduit to said chamber forming the only communication with said chamber and having the end opening into said chamber arranged to be sealed by a liquid in said chamber, whereby the air or gas in said chamber is confined and forms a cushion, substantially as described.

14. In a gas or vapor burner, the combination with a generating-retort, of a discharge-orifice for the gas or vapor, a conduit from said retort to said orifice, a regulating-chamber below said orifice, and a pipe leading from said conduit down within said chamber and forming the only communication with said chamber, whereby the end of said pipe is sealed by liquid in the chamber, substantially as described.

15. In a gas or vapor burner, the combination with a discharge-orifice for the gas or vapor, of a closed chamber below said orifice, a pipe leading from said orifice down within said chamber, and a valve-rod extending

through said pipe and chamber, substantially as described.

16. In a gas or vapor burner the combination with the base provided with a trough and rim 12, of a cylinder 9 supported on said rim, a throat-piece 7 within said cylinder, a hood inclosing cylinder 9, exit-orifices at the base of said hood, a tray 40 within the base, arms 22 supporting said tray and provided with passages 41, and a discharge-orifice for the gas or vapor above said tray and within the lower end of the throat-piece 7, substantially as described.

17. In a gas or vapor burner the combination with a cylindrical base provided with trough 21, of a mixing-chamber supported therefrom, exit-orifices for the intermingled air and gas or vapor, a passage from said chamber to said orifices, a discharge-orifice for the gas or vapor within the lower end of said mixing-chamber, a tray 40 below said orifice, arms 22 connecting said tray to the base and provided with passages 41, substantially as described.

18. In a gas or vapor burner the combination with the base provided with a cylindrical rim 12, a cylinder 9 supported thereon, a throat-piece 7 supported within said cylinder and closing the top thereof, a hood 18 inclosing the cylinder 9, exit-orifices at the base of the hood, and a discharge-orifice within the lower end of the throat-piece 7, substantially as described.

19. In a gas or vapor burner the combination with a base provided with the rim 12 and trough 21, of a cylinder 9 supported on said rim, a throat-piece 7 within said cylinder and closing the top thereof, a ring 14 provided with exit-orifices, a hood 18 surrounding said cylinder 9, and an exit-orifice for the gas or vapor within the lower end of the throat-piece 7, substantially as described.

20. In a gas or vapor burner, the combination with a discharge-orifice for the gas or vapor, a mixing-chamber, exit-orifices communicating with the mixing-chamber, a base for supporting said parts, and a plurality of supporting-arms pivotally connected to said base, substantially as described.

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