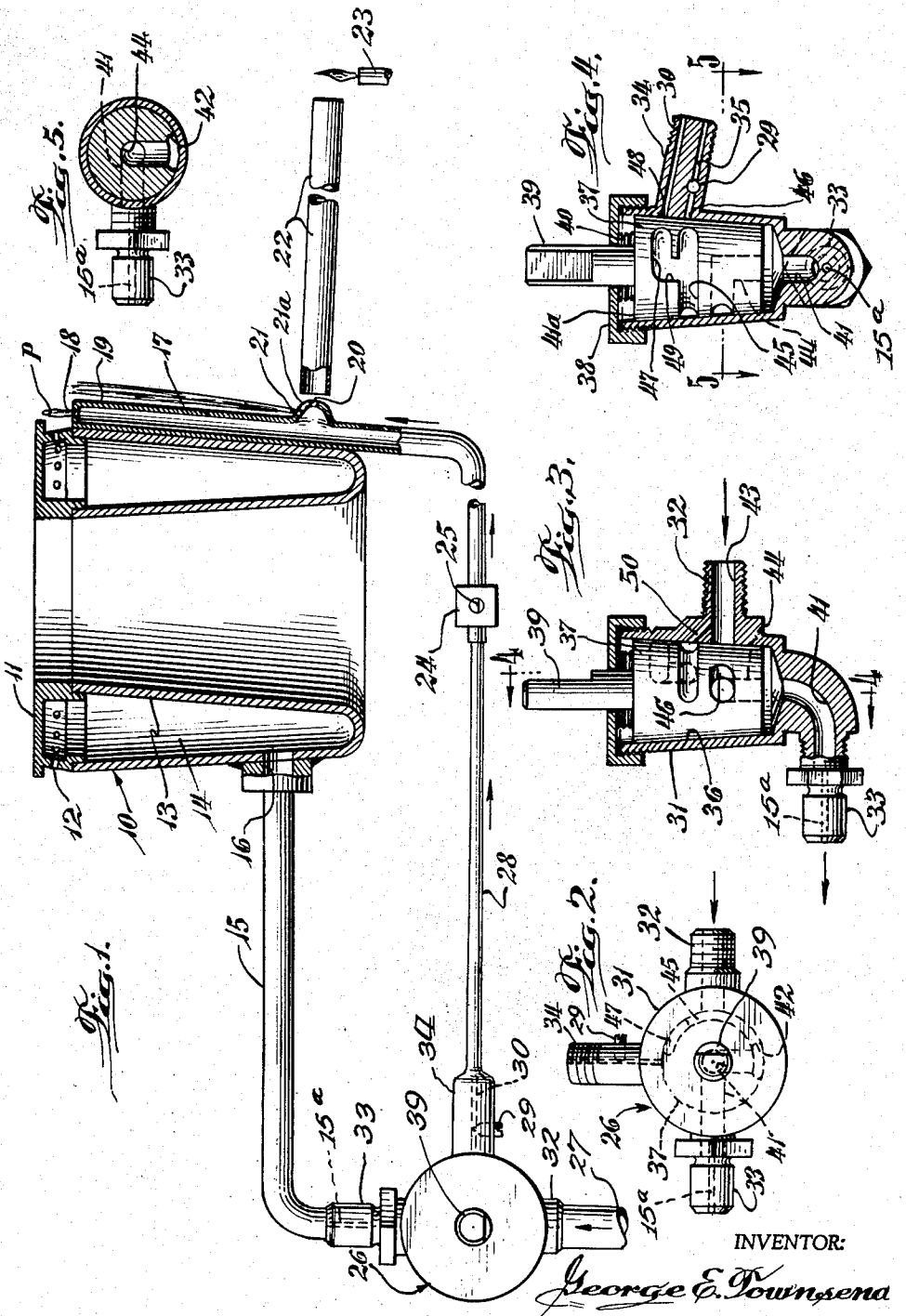
April 6, 1965 G. E. TOWNSEND 3,176,753

FLUID FUEL BURNER APPARATUS

Filed Aug. 31, 1961



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United States Patent Office 3,176,753
Patented Apr. 6, 1965

3,176,753

FLUID FUEL BURNER APPARATUS

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Filed Aug. 31, 1961, Ser. No. 135,270
3 Claims. (Cl. 158—115)

This invention relates to burner apparatus having an ignition system and in particular to burner apparatus including drilled port atmospheric burners.

In conventional burner apparatus, it is necessary to deliver fluid fuel, such as combustible gas, at a substantial rate to the main burner head in order to build up a sufficient back pressure therein to provide the necessary gas flow through an associated flash tube to a standing pilot so that flashback of the gas may occur in the flash tube to ignite the gas at the burner head. If the burner is subsequently adjusted to have a relatively low flame, and the flame is for any reason extinguished, the gas is not automatically re-ignited as there is insufficient gas flow through the flash tube to effect the necessary flashback. Thus, an undesirable build-up of gas may occur prior to the reignition of the burner. Similarly, it has in the past been difficult with available ignition systems to achieve instantaneous ignition at low temperature settings of the burner apparatus.

One solution to this problem has been to provide a simmer burner in conqunction with a main burner, the simmer burner remaining ignited at all times. This arrangement has the serious disadvantage of providing a localized area of heat in the simmer operation, which may cause undersirable hot spots in the utensils and the like used in conjunction with the burner. The present invention comprehends an improved burner apparatus providing an ignition pilot flame at all rates of delivery of gas to the burner head, thereby permitting the burner head to perform both as a simmer burner and a main burner while yet assuring re-ignition of the burner in the event that the flame is blown out when the burner is operating with a small flame as a simmer burner. This invention further comprehends an improved ignition apparatus capable of providing increased gaos pressures to the ignition apparatus at low temperature burned setting to assure positive burner ignition at these lower burner settings.

Thus, a principal feature of the present invention is the provision of a new and improved ignition apparatus for a gas burner.

Another feature of the invention is the provision of such a burner apparatus having new and improved means for maintining a pilot flame for ignition of gas delivered to a burner head at both low and high rates.

A further feature of the invention is the provision of such a burner apparatus including new and improved valve means for delivering gas to the ignition pilot at a high rate whenever gas is being delivered to the burner head at a low rate.

Still another feature of the invention is the provision of such a burner apparatus wherein the delivery of gas to the ignition pilot and the burner head is controlled by a single-valve device.

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIG. 1 is a schematic diagram, with portions broken away, of a burner ignition apparatus embodying the invention;

FIG. 2 is a plan view of the valve means thereof;

FIG. 3 is a vertical diametric section of the valve means;

FIG. 4 is a vertical diametric section of the valve means taken substantially along the line 4—4 of FIG. 3; and

FIG. 5 is a horizontal section of the valve means taken substantially along the line 5—5 of FIG. 4.

In the exemplary embodiment of the invention as disclosed in drawing, a drilled port atmospheric burner generally designated 10 is shown to comprise a burner head 11 provided with a plurality of peripheral ports 12 carried by a burner body 13 to define an annular chamber 14. Combustible gas is delivered to chamber 14 through a conduit 15 having a conventional venturi 15*a* and defining a first flow pasage 16. Laterally adjacent the body 13 is an ignition pilot device or tower 17 comprising an upright tube having a port 18 at its upper end 19, a laterally opening port 20 spaced substantially below upper end 19, and an upwardly inclined port 21 immediately above and interconnected to port 20 by a slot 21*a* which is substantially smaller in width compared to he diameters of ports 20 and 21. A conduit 22 extends from adjacent port 20 to adjacent a standing pilot 23 to define a flash tube. The pilot tube 17 is connected to an aerator 24 of conventional construction provided with air inlets 25 for delivering primary air to mix with the combustible gas in tube 17. The combustible gas is delivered to aerator 24 and conduit 15 from a valve 26 connected to a suitable gas supply line 27.

More specifically, the combustible gas is delivered to aerator 24 through a conduit 28. The valve 26 is provided with a conventional adjustment gland 29 for regulating the pressure of the gas delivered to the conduit 28 from gland 29 to approximately ½ inch of water. The valve further defines a bypass passage 30 connected to conduit 28 downstream of gland 29.

As brought out more fully hereinafter, the purpose of bypass 30 is to provide gas to pilot tube 17 at an increased rate of flow when desired. More speccifically, the valve 26 is arranged to deliver gas at high rate through bypass conduit 30 for instant ignition of the pilot flame P before the cumbustible gas is delivered to the burner chamber 14. Thus, a pilot flame P may be maintained at port 18 of the pilot tube 17 at all times while gas is flowing to the main burner head 11. Pilot tube 17 and conduit 28 effectively define a second flow passage for delivery of gas to the port 18. Flash tube 22 effectively defines a third flow passage for delivery of gas from port 20 to standing pilot 23 for flashback thereof to ignite gas passing outwardly through port 21, which in turn ignites the gas passing outwardly through port 18 to form the pilot flame P. Further, the bypass passage 30 defines a fourth flow passage bypassing the adjustment gland 29 to provide, at preselected times, a high rate of gas flow to the pilot tube 17 to instantly ignite gas flowing from burner port 18 to provide tower flame P.

Turning now to FIGURES 2–5, the value 26 is shown to comprise a valve body 31 having a threaded inlet 32 for connection thereto of gas supply conduit 27, an outlet 33 for connection thereto of delivery conduit 15, and a threaded outlet 34 for connection thereto of conduit 28. Outlet 34 defines the bypass flow passage 30 and a flow passage 35 in which the adjustment gland 29 is provided.

The valve body 31 internally defines a frusto-conical valve chamber 36 in which is seated a correspondingly frusto-conical plug 37. The upper end of cavity 36 is closed by a cap 38 threadedly secured to the valve body, and an operating shaft 39 extends rotatably through the cap 38 for rotating the plug 37 about its longitudinal axis within the chamber 36. A coil spring 40 is disposed concentrically about the operating shaft 39 and is compressed between the cap 38 and the upper surface 41*a* of the plug 37 to maintain the plug in facial engagement with the valve body while permitting controlled rotation of the plug about its axis. As best seen in FIG. 3, the outlet 33 defines a passage 41 communicating with the bottom of chamber 36. A first radial opening 42 is provided in the

plug at the level of the bore 43 through inlet 32 and an axial passage 44 extends downwardly from opening 42 to the bottom of the plug to provide communication between the inlet bore 43 and the outlet 41 when the plug is rotated in a counterclockwise direction as seen in FIG. 2 between approximately 60 degrees and approximately 90 degrees from the off position shown in FIG. 2. Thus, as more and more of the opening 42 is exposed to the bore 43, the rate of flow of the gas to the chamber 14 increases correspondingly until the bore 43 is completely exposed to the opening 42 whereupon the flow rate is maximum.

As best seen in FIG. 4, the plug 37 is further provided with an arcuate peripheral groove 45 aligned with the end 46 of passages 35 opening into chamber 36 and an arcuate peripheral groove 47 aligned with the end 48 of passage 30 opening into chamber 36. The grooves 45 and 47 are connected by means of a short longitudinally extending peripheral groove 49. As shown in FIGURE 3, a small passage 50 is provided through body 31 communicating at one end with inlet passage 43 and at the opposite end with chamber 36 for delivering gas from inlet 32 into the groove 45. Groove 45 is constantly under gas pressure regardless of its "on" or "off" position. Groove 47 is substantially shorter than groove 45 and thus gas is delivered from groove 45 through grooves 49 and 47 to bypass passage 30 when the right hand portion of groove 45, as seen in FIGURE 4, is in communication with passage 35. When the right hand portions of grooves 45 and 47 as viewed in FIGURE 4 are in communication with passages 30 and 35, a high rate of gas flow is provided in pilot tube 17 through bypass flow passage 30 for instant ignition of pilot flame P. As shaft 39 is rotated in the counter clockwise direction groove 47, because of its shorter length, terminates communication with passage 30 and the gas supply to the pilot tube 17 is maintained through passage 35 at a substantially reduced rate of flow. Adjustment gland 29 provides for the reduced flow rate of gas. At this point, due to continued rotation of shaft 39 in the counterclockwise direction, opening 42 establishes communication with inlet bore 43 to allow gas to flow from inlet bore 43, into conduit 15 and from ports 12 of burner head 11 for ignition by pilot flame P. Therefore, whenever a combustible gas mixture emanates from ports 12, it is ignited immediately by pilot flame P. This feature allows the main burner to maintain a simmer position without the danger of the burner flame being extinguished for a sufficient period to allow a substantial build-up of unignited gas before reignition. Due to the construction of valve 26, which provides for sequential ignition of the pilot and main burner 10, main burner 10 is not supplied with a combustible gas until pilot flame P has been established. Further, as the burner head 11 is utilized for both the simmer and high heat functions, a uniform distribution of the heat is provided at all times throughout the various burner valve settings, providing a substantial improvement over the conventional structures wherein a separate small simmer burner is provided which tends to localize the heat in a small area at simmer settings.

Valve 26 is extremely simple, inexpensive and foolproof in operation. The positive providing of the pilot flame P afforded by the valve 26 is a highly desirable feature, particularly where the burner apparatus is cycled by a thermostatic control to provide a preselected temperature, as in such cycling operations the chance for blow-out of the main burner and build-up of unignited gas before reignition is substantially increased.

While I have shown and described one embodiment of my invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. Burner apparatus comprising: a source of fluid fuel; a burner head; a standing pilot spaced from said burner head; an ignition pilot device adjacent said burner head; means defining a first flow passage for delivering combustible fluid fuel to said burner head; means defining a second flow passage for delivering combustible fluid fuel to said ignition pilot device; means defining a third flow passage between said second flow passage and said standing pilot for receiving fluid fuel from said second flow passage to flash back and ignite fluid fuel delivered to said ignition pilot device thereby to ignite fluid fuel delivered to said burner head; and manually controlled valve means controlling the delivery of fluid fuel through said flow passages including means for delivering fluid fuel to said second passage for flow to said ignition pilot device at a high rate for instantaneous ignition of said pilot device and then at a low rate to maintain said ignition of said pilot device, said valve means delivering fluid fuel to said first passage selectively over a range of flow rates only after the ignition of said pilot device.

2. Burner apparatus comprising: a source of fluid fuel; a burner head; a standing pilot spaced from said burner head; an ignition pilot device adjacent said burner head; means defining a first flow passage for delivering combustible fluid fuel to said burner head; means defining a second flow passage for delivering combustible fluid fuel to said ignition pilot device; means defining a third flow passage between said second flow passage and said standing pilot for receiving fluid fuel from said second flow passage to flash back and ignite fluid fuel delivered to said ignition pilot device thereby to ignite fluid fuel delivered to said burner head; a fourth flow passage communicating with said second flow passage; and manually controlled valve means receiving fuel from said source for controlling the delivery of fluid fuel through said flow passages including means for delivering fluid fuel to said first passage selectively at low and high rates, means for delivering fluid fuel, to said second passage at a low rate at all times during delivery of fuel to said first passage, said valve means delivering fluid fuel through said fourth flow passage for causing a high full flow to said second flow passage and instantaneous ignition of said pilot device before delivery of fluid fuel through the first flow passage to said burner head, said valve means comprising a valve body having a fuel inlet communicating with said source, and first, second and fourth outlets each respectively communicating with said first, second and fourth flow passages, and means in said valve body for selectively and sequentially delivering fluid fuel from said fuel inlet to said fourth, second and first outlets from said inlet upon operation of said valve means to supply fuel from said source to said corresponding flow passages.

3. The apparatus of claim 2 wherein said valve body comprises a single valve casing and a single valve plug therein, containing said first, second and fourth outlets and said inlet.

References Cited by the Examiner

UNITED STATES PATENTS

2,078,576	4/37	Laghetto	158—115
2,104,298	1/38	Gauger	158—115
2,898,979	8/59	Hollman et al.	158—116

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