

1

3,339,617
BURNER

Aatto P. Saha, Jamesville, N.Y., assignor to Carrier Corporation, Syracuse, N.Y., a corporation of Delaware
Filed Mar. 1, 1965, Ser. No. 436,007
4 Claims. (Cl. 158—115)

This invention relates to a fuel burner and, more particularly, to an igniter in a burner for gas or similar fuel.

The illustrated embodiment of the invention is directed to an igniter having a spark plug with electrodes encased in a tube having an end opening into a fuel supply pipe. Air is forced through ports in the tube and past the electrodes' spark gap to form a combustible mixture with gas within the fuel supply pipe, and to retard overheating of the electrodes and to fan the spark into the combustible mixture to ignite the mixture. The electrodes are of a configuration associated with the tube and fuel supply pipe to retard fouling of the electrodes.

It is a primary object of this invention to provide a new and improved burner and, more particularly, to provide a new and improved igniter in a burner for gas or similar fuel.

Another object is to provide a new and improved igniter in a burner wherein air fans a spark into a combustible mixture to ignite the mixture. A related object is provision therein for mixing the air with fuel to form the combustible mixture. Another related object is provision therein for retarding fouling of electrodes which provide the spark.

These and other objects of the invention will be apparent from the following description and the drawing which is a fragmentary, schematic, longitudinal sectional view of a gas burner mounted on one end of a combustion chamber.

As illustrated in the drawing, a combustion chamber in the form of a furnace 10 includes a cylindrical side wall 11 and an end wall 12 with suitable refractory material 13 forming a frusto-conical concavity 14 diverging generally from the end wall 12 to the side wall 11. A gas burner includes a nozzle 15 illustrated in the form of a flat perforated disc operatively seated in the small portion of the frusto-conical concavity 14 and communicating through a chamber 16 with the outlet end 17 of a gas supply conduit or pipe 18 which opens through the furnace end wall 12. A plenum 19 encases the burner end of the furnace 10 for passing combustion air from a suitable blower 20 and through vanes or ports 21 in the furnace side wall 11 forward of the refractory material 13. The blower 20 may be of any suitable type and, as illustrated, includes a blower drive shaft 22.

An igniter 23 is illustrated in the form of a tube 24 having an open end 25 opening into the gas supply pipe 18. A spark plug 26 is suitably threadedly seated in and closes an end 27 of the tube 24 opposite the open end 25. The spark plug 26 has elongated electrodes 28 and 29 extending to free ends 30 at the open end 25 of the tube 24. From the free ends the electrodes converge toward each other to a spark gap 31 and then diverge from each other so that upon firing the plug the spark originates at the spark gap 31. An ignition wire 32 leads from the spark plug cap 33 to suitable electrical equipment 34 for firing the plug to generate a spark. The tube 24 extends into the plenum 19 and has a plurality of ports 35 for providing communication between the interior of the plenum and the interior of the tube 24. Air passing from the plenum 19 sweeps through the tube 24 past the spark gap 31 and into the pipe 18 to form a combustible mixture with the gas in the pipe and to fan the spark from the gap 31 into the resultant combustible mixture in the pipe

2

18 to ignite the mixture. Upon the spark being fanned by the air, it is enlarged to resemble a flame and is displaced toward the combustible mixture in the pipe 18. The air passing through the tube 24 also retards overheating of the electrodes 28 and 29 and formation of carbon and other foreign material on the electrodes particularly in the vicinity of the spark gap.

In the preferred embodiment, the gas supply pipe 18 has a bend 37 at about a right angle along the longitudinal axis of the pipe just inwardly of the pipe end 17 and its juncture with the furnace end wall 12. When the burner is lighted, a gas valve 38 is partially open so that the flow of gas through the pipe 18 is substantially less than the flow during normal operation of the burner, to provide a small supply of pilot fuel which upon being ignited provides a pilot flame 40 which continues to burn as the gas valve 38 is opened to permit the normal flow of gas through the pipe to be ignited by the pilot flame 40 and burn in the furnace 10.

As the small quantity of pilot gas passes through the pipe 18, it flows along the outer portion 41 of the bend and through the outlet end 17 of the pipe into the chamber 16 and then through the perforations of the nozzle 15 into the furnace. The tube 24 is positioned so that it opens through the outer portion 41 of the bend 37 at the furnace end wall 12 along the downstream portion of the bend. Thus the gas is caused to flow across the open end 25 of the tube 24 to form a combustible mixture with the air from the tube and is ignited upon firing of the spark plug.

The association between the electrodes 28 and 29 and particularly the spark gap 31, the tube open end 25 and the bend 37 in the fuel supply pipe 18 should be carefully determined so that the spark can be effectively fanned into the combustible mixture formed by the small quantity of pilot fuel passing through the supply pipe 18 and the air passing through the tube 24. If the spark gap 31 is too close to the open end 25 of the tube 24, or if the free ends 30 of the electrodes 28 and 29 extend from the open end of the tube sufficiently to collect deposits of carbon, the plug 26 may be fouled. If the electrodes 28 and 29 are too far removed from the combustible mixture, that is, too far from the free end 25 of the tube 24, the spark may be expended before reaching the combustible mixture so that proper ignition will not occur.

While a preferred embodiment of the invention has been described and illustrated, it should be understood that the invention is not limited thereto but may be otherwise embodied within the scope of the following claims

I claim:

1. A gas burner including a nozzle for the passage of gas into a combustion chamber, gas supply means for passing the gas through said nozzle and into the combustion chamber during normal operation of the burner and for passing substantially less than the quantity of gas passed during normal operation to provide pilot gas for igniting the burner, air supply means including a plenum for passing air into the combustion chamber to mix with the gas and form a combustible mixture during normal operation of the burner, and means for igniting the combustible mixture including, spark-generating means comprising a pair of electrodes generally converging from free ends toward a spark gap and then generally diverging from said spark gap, whereby a spark originates at said spark gap, and means including a tube extending longitudinally about said electrodes from a portion communicating with said plenum to a portion past said spark gap and communicating with said gas supply means generally at said free ends for the passage of combustion air from said plenum along said electrodes past said spark gap and into said gas supply means to mix with the pilot gas and form a combustible mixture and to fan the

3

spark into the resultant combustible mixture in said gas supply means and ignite the mixture.

2. A burner including a fuel supply pipe having a bend, a tube transverse to said pipe and having an open end opening into said pipe at an outer portion of said bend, a spark plug operatively positioned in said tube and having electrodes within said open end, and means for the passage of air through said tube past said electrodes and into said pipe.

3. A gas burner including a plenum for the passage of air into a combustion chamber, a gas supply pipe for the passage of gas into the combustion chamber, said pipe having a bend, a tube transverse to said pipe and having an open end opening into said pipe at an outer, downstream portion of said bend, said tube extending into said plenum, a spark plug operatively positioned in said tube and having electrodes with free ends within said open end, said electrodes converging from said free ends to a spark gap spaced inwardly of said open end, and ports in said tube providing communication between said plenum and the interior of said tube for the passage of air through said tube past said spark gap and into said pipe to form a combustible mixture with the gas in said pipe and to fan the spark from the spark plug into said pipe to ignite the combustible mixture.

4. An igniter for a fuel burner including fuel supply

4

means for passing fuel to be burned, means for igniting the fuel including spark generating electrodes in communication with said fuel supply means, air supply means to mix combustion air with the fuel and form a combustible mixture and to fan the spark into the resultant combustible mixture and ignite the mixture, the last said means including means for the passage of air along said electrodes and into said fuel supply means, means for passing through said fuel supply means substantially less than the quantity of fuel passed during normal combustion to provide pilot fuel for igniting the burner, said fuel supply means including conduit means having a portion curved along the longitudinal axis of the conduit means for directing the pilot fuel along the outer portion of said curved portion, said igniting means being along said outer portion.

References Cited

UNITED STATES PATENTS

1,336,261	4/1920	Scott	-----	158—115	X
1,533,420	4/1925	Hurd	-----	158—109	
2,645,082	7/1953	Sarto	-----	158—28	X
2,655,209	10/1953	Newton	-----	158—28	
2,876,832	3/1959	Peters	-----	158—115	

JAMES W. WESTHAVER, *Primary Examiner.*