This invention relates to new and useful improvements in gas pilots and other small flame burners.

One of the most acute problems in the distribution and utilization of commercial gas in domestic appliances, is that of flame recession brought about through obstruction of the gas passageways, especially in pilots and other small flame burners that are equipped with so-called needle valves for controlling the flow of gas to the burners.

This is especially true when using manufactured gas which contains such compounds as camphor, indenes, pyridines, and other oils and resins which tend to deposit upon the annular surfaces of the needle valve and its seat, and thereby obstruct the flow of gas to the orifice which the adjustment of the needle controls.

The result of this accumulation of foreign matter upon the needle valve and its seat is a gradual diminishing of the gas flame due to the smaller amount of gas passing the partially obstructed passages, until the condition subsequently reaches a point where a complete servicing and cleaning of the needle valve and its seat becomes necessary, or a readjustment of the complete burner, to restore the operation of the burner to its normal condition, whereby an unrestricted gas flow to the appliance being served is again obtained.

The novel valve structure herein disclosed has been designed to overcome the problem above referred to, and it may readily be applied to various types of gas pilots and small flame burners now in use, whereby the operations of such burners will be greatly improved. It does not utilize a needle valve for controlling the flow of gas to the burner, but in lieu thereof makes use of a variable orifice which has no annular surface upon which obstructing materials may accumulate, and which is always capable of accurately controlling the supply of gas to the burner so that the flame may be varied from zero to maximum with very little danger of clogging due to the deposition of obstructing materials, and thereby substantially eliminating any further recession of flame and its consequent difficulties.

The particular object of the invention therefore is to provide an improved valve structure particularly applicable for use in connection with gas pilots and other small flame burners, whereby such devices may be made to operate almost indefinitely with a non-receding flame, and substantially without adjustment, when once set.

Other objects of the invention will appear from the following description and accompanying drawings and will be pointed out in the annexed claims.

In the accompanying drawings, there has been disclosed a structure designed to carry out the various objects of the invention, but it is to be understood that the invention is not confined to the exact features shown as various changes may be made within the scope of the claims which follow.

In the drawings:

- Figure 1 is a longitudinal sectional view of a conventional gas pilot valve showing the invention applied thereto;
- Figure 2 is an end view of Figure 1;
- Figure 3 is a view showing the improved valve for controlling the supply of gas to the pilot light;
- Figure 4 is an enlarged detail sectional view on the line 1—1 of Figure 1;
- Figure 5 is a view partially in section showing the invention applied to the discharge side of a valve such as used for supplying gas to an ordinary gas range burner;
- Figure 6 is an enlarged detail sectional view of the discharge end of the valve shown in Figure 5;
- Figure 7 is a view showing the invention applied to an automatic pilot light;
- Figure 8 is a view partially in section showing the invention applied to a gas burner of a type used for operating certain types of refrigerating apparatus;
- Figure 9 is a top view of the improved valve shown in connection with the burner illustrated in Figure 8;
- Figure 10 is a vertical sectional view on the line 10—10 of Figure 9, showing the general construction of the valve; and
- Figure 11 is a cross-sectional view on the line 11—11 of Figure 10.

In the selected embodiment of the invention here shown, there is illustrated in Figures 1 and 2, for purposes of disclosure, a valve structure of ordinary construction such as is commonly used in connection with the gas pilots of various types of gas ranges. This valve structure comprises a body portion 2 having a chamber 3 therein provided with a port 4 leading through a threaded extension 5, by means of which the valve body may be connected to the usual pipe leading to the pilot light. This pipe and the pilot light are of well known construction and it is therefore unnecessary to show the same in the drawings.

The opposite end of the body 2 has a threaded...
socket 6, whereby it may be connected to the usual gas supply pipe or manifold, not shown. A duct 7 connects the threaded socket 6 with a valve 8 provided in a valve cage 9 received in threaded engagement with the walls of the chamber 3. A suitable spring-actuated valve 11 is shown mounted in the cage 9 and is adapted to be manually actuated by a button 12 provided thereon. Thus, to thereby temporarily increase the supply of gas to the pilot light. The valve 11 is normally retained in closed position by the action of a spring 13 and, when depressed, communication is established between the duct 7 and the port 4, whereby a charge of gas is supplied to the gas pilot to cause the latter to function and light the burner with which it is associated.

In valve structures of the type above described, means is provided for allowing a small portion of gas to continually flow therethrough from the supply pipe or manifold to supply the pilot light with sufficient gas to keep it constantly burning. To thus constantly supply the pilot light with gas, a small by-pass 14 is provided in the valve body 2 between the socket 6 and the valve chamber 3. The by-pass 14 is intersected by a bore 15 in which there is rotatably mounted a cylindrical valve 16 having a passage 17 therein which may be aligned with the by-pass 14. The valve 16 has a stem 18 provided with a screw driver slot 19, whereby the stem 18 may be rotated to relatively adjust the position of the head 16 to control the flow of gas through the by-pass 14. A suitable packing nut 22 is apertured to receive the stem 18 and is received in threaded engagement with the body 2 to thereby retain the valve 16 in the bore 15. A suitable packing 23 is shown provided between the valve head 16 and the adjacent passage 24, to prevent leakage of the gas around the stem 18 and also, whereby the valve 16 may be retained in adjusted position by friction.

The passage 17 provided in the valve head 16 is adapted to be aligned with the by-pass 14 in the valve body 2, as shown in Figure 1, and by relatively rotating the valve head 16 with respect to the by-pass 14, as shown in Figure 4, the constant flow of gas through the by-pass 14 may be conveniently regulated. The by-pass 14 is situated above the bottom wall or floor of the chamber 3 so as to prevent any condensate which may develop in said chamber from entering and obstructing the by-pass.

The valve head 16 is circular in cross-section, as clearly illustrated in Figure 4, and the passage 17 provided therein is so located that it may readily be aligned with the by-pass 14, as hereinafter stated. By using a cylindrical valve, as shown in Figures 3 and 4, no surfaces are provided upon which foreign matter may accumulate and subsequently interfere with the operation of the pilot such as causing recession of the pilot flame. By slotting the end of the stem 18, the valve 16 may be conveniently adjusted to accurately control the constant supply of gas to the pilot light, and when once adjusted to permit the proper flow of gas through the by-pass 14, the pilot light may operate for a long period of time without requiring attention, the danger of clogging as a result of foreign matter accumulating upon the valve structure being substantially eliminated.

In Figures 5 and 6, the invention is shown applied to a valve 24 such as are usually employed in connection with gas ranges for controlling the supply of gas to the usual burners thereof. This valve is shown comprising a body portion 25 having a tapered valve seat 30 the end adapted to receive a tapered valve 27 provided with an operating handle 28. The tapered valve 27 is retained in leak-proof engagement with the valve seat 26 by the action of a spring 29 coiled about the lower reduced portion 31 of the tapered valve stem 27 and retained therein by a suitable nut 32, suitably secured to the lower end of the valve stem. A threaded extension 33 is provided at one side of the valve body 25 whereby the valve may be connected to a suitable gas supply manifold or pipe, not shown in the drawings. Directly opposite from the threaded extension 33, there is shown a threaded nipple 34 having a reduced cylindrical end portion 35 adapted to be received in a bore 36 provided in an elongated adjusting nut or member 37, received in threaded engagement with the nipple 34. The nut 37 is provided with a flanged head 38 which preferably is hexagonal in cross-section to permit the application of a wrench thereto. A suitable orifice 39 is provided in the discharge end of the nut 37 adapted to communicate with a plurality of ducts 41 provided in the wall of the reduced end portion 35 of the valve nipple 34. The bore 36 is shown formed in an inwardly directed annular flange 42 of a suitable width to permit the effective sizes of the ducts 41 in the reduced end portion 35 of the nipple 34 to be varied to thus control the flow of gas to the receiving head 43 of a pipe 44 leading from the control valve 24 to the usual range burner, not shown.

In Figures 5 and 6, the sleeve nut 37 is shown positioned to permit but a small flow of gas through the orifice 39 into the pipe 44. By rotating the sleeve nut 37 to the right, the inwardly directed flange 42 will be moved in a direction towards the left, when viewed as shown in Figures 5 and 6, whereby the effective sizes of the ducts 41 in the reduced end portion 35 will be increased so as to permit a greater flow of gas from the valve 24 to the pipe 44. It will thus be seen that by manipulation of the sleeve nut 37, the valve structure may be positioned so as to permit the proper amount of gas to flow to the burner when the valve lever 28 is moved to its wide open position.

The principle of operation of the structure shown in Figures 5 and 6 is substantially the same as that disclosed in Figures 1 to 4, in that no tapered valves or valve seats are required to control and regulate the flow of gas from the valve 24 to the pipe 44.

In Figure 7, we have shown the invention applied to a device commonly known as an automatic pilot light, which is used in connection with various kinds of gas burners. This valve comprises a suitable burner head 45 shown comprising an upper perforated cap 46 and a lower member 47 in which the usual pilot light nozzle is suitably mounted. The lower member 47 is suitably secured to the upper end of a pipe 48. A valve body 49 is shown secured to the lower end of the pipe 48 and has a threaded nipple 51 for connecting it to a suitable gas manifold or pipe. A gas passage 52 is provided in the valve 49 and extends lengthwise therethrough. A cylindrical valve 53 having a transverse passage 54 therein, is mounted in a bore 55 provided in the valve body 49. The passage 54 is adapted to be moved into registration with the passage 55 to thereby control the flow of gas from the supply source to the burner 45.

The valve 53 is retained in the bore 55 by a suitable packing nut 56 and a packing 57, and it has 155.
a slotted stem 58 projecting through the packing nut 56 whereby the valve 53 may be conveniently adjusted by a suitable instrument such as a screw driver.

Figures 8, 9, 10, and 11 illustrate the invention applied to a small flame burner such as are commonly used in connection with certain types of gas refrigerating apparatus. This burner comprises a burner head 59 provided at the upper end of a suitable pipe 61, the lower end of which has an enlarged cylindrical portion 62 adapted to receive a nozzle 63 secured to the lower portion 64 of the structure. A pipe 65 has one end connected to the portion 64 and its opposite end is adapted to receive one end of a gas supply pipe 66, which may be connected to a suitable gas supply, not shown.

A threaded socket 67 is provided in the lower portion 64 of the burner, and is adapted to receive a threaded sleeve 68. A portion of the threads of the sleeve 68 are cut away, as shown in Figure 10 to provide an annular recess 69 adapted to register with the end of the pipe 65, when the sleeve is inserted in the threaded socket 67, as will be clearly understood by reference to Figures 8 and 10.

The threaded sleeve 68 is provided with a bore 71 adapted to receive a sleeve valve 72, which preferably is hollow as shown, and has a slit or slot 73 in its wall whereby it may be slightly expanded so that it may be frictionally retained in adjusted position within the bore 71 of the sleeve 68. A suitable aperture 74 is provided in the wall of the sleeve valve 72 which may be moved into registration with a correspondingly shaped aperture 75, provided in a wall of the threaded sleeve 68, as shown in Figures 9 and 11. When the apertures 74 and 75 are in registration, gas will flow from the pipe 65 into the hollow sleeve valve 72 from which it will discharge upwardly through the nozzle 63 and into the burner pipe 61.

A suitable screen cage 76, surrounds the lower portion of the pipe 61 to cleanse the air drawn into the burner pipe 61. The lower end of the sleeve valve 72 may be slotted, as shown at 77, whereby said valve may be conveniently rotated by means of an ordinary screw driver or similar device. A suitable cap 78 is received in threaded engagement with the lower end of the socket 67 to retain the threaded sleeve 68 therein.

The result obtained by the use of the sleeve member 72 and threaded sleeve 68, shown in Figures 8 to 11, is similar to the results obtained by the use of the devices disclosed in Figures 1 to 7, inclusive, in that no tapered valves are used in the construction thereof for controlling the constant supply of gas to the burner 59. In some instances, it may be desirable to use the sleeve valve 72 and threaded sleeve member 68 in connection with such valve structures as shown in Figures 1 and 7, in which case the cylindrical valve members 16 and 53 would, of course, be dispensed with.

We claim as our invention:

1. A device of the character described wherein the passage for the gas for the pilot flame is so small as to cause difficulty by the deposition of gum-like material when controlled by a needle valve, said device comprising a body having an inlet opening adapted for connection to a gas supply and an outlet opening connected to the pilot or igniter flame, said body having a small passage establishing communication between said inlet and outlet openings, an apertured element movable for varying the effective size thereof and forming therewith a metering orifice having relatively small wall surfaces, the area of the cross section of the aperture in said element when in operative position being relatively larger in size than the area of said metering orifice.

2. A device of the character described wherein the passage for the gas for the pilot flame is so small as to cause difficulty by the deposition of gum-like material when controlled by a needle valve, said device comprising a body having an inlet opening adapted for connection to a gas supply and an outlet opening connected to the pilot or igniter flame, said body having a small passage establishing communication between said inlet and outlet openings, and a valve member mounted in said body and having a portion movable with respect to the walls defining said passage to provide a variable orifice, the portion of said valve member cooperating with said passage defining a metering orifice having relatively sharp edges and providing a concentrated opening for all adjustments of said valve.

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