Oct. 17, 1944. S. W. E. ANDERSSON 2,360,310

GAS BURNER

Original Filed May 8, 1937

Fig. 1.

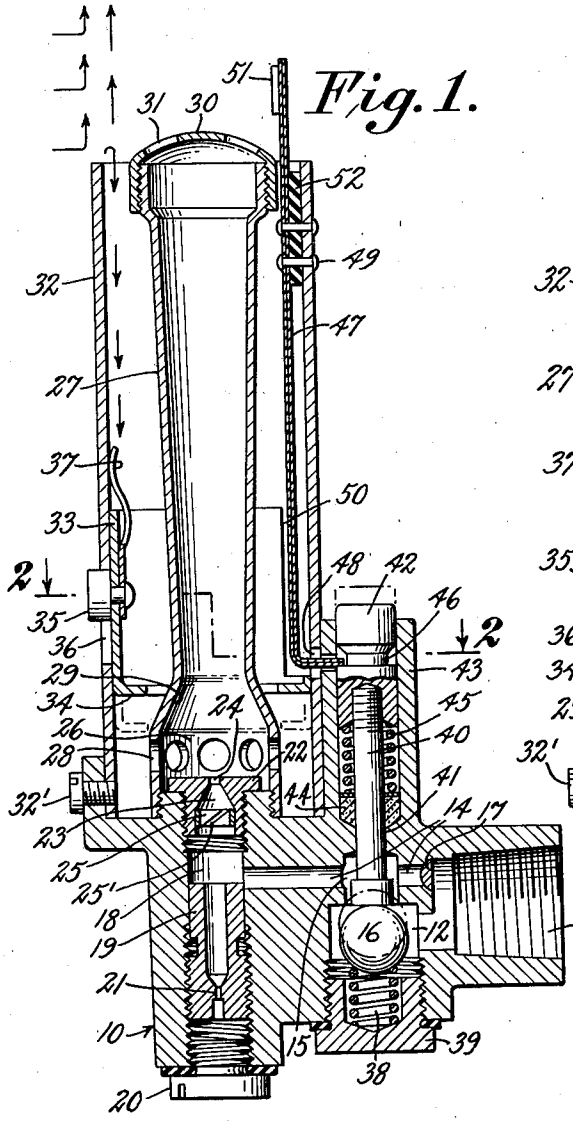


Fig. 3.

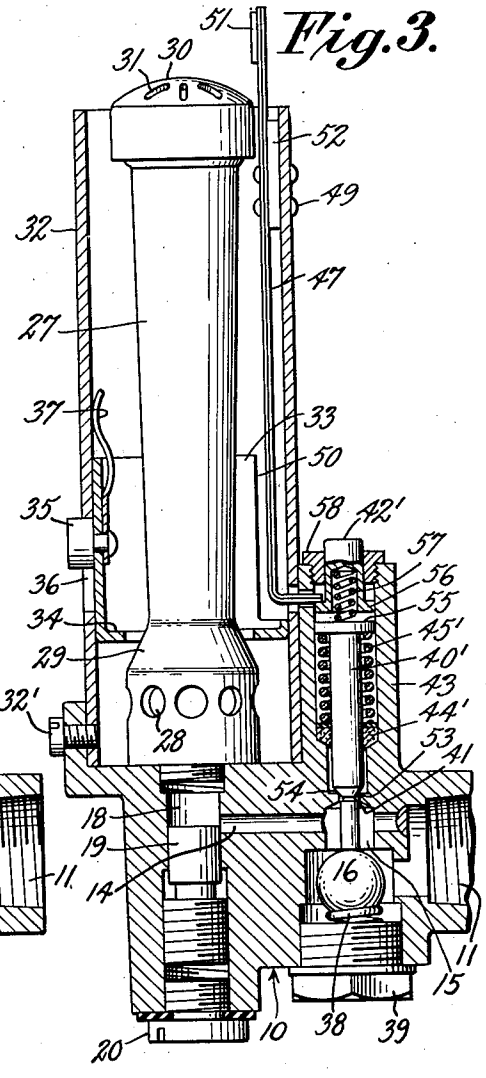
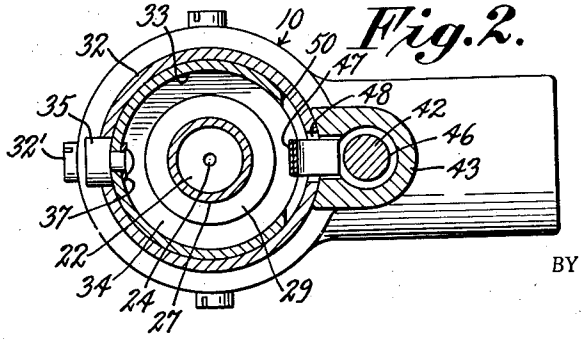


Fig. 2.



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2,360,310

GAS BURNER

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Original application May 8, 1937, Serial No. 141,423. Divided and this application May 8, 1940, Serial No. 333,909

2 Claims. (Cl. 158—118)

This invention relates to gas burners which provide a heating flame resulting from a mixture of air and a combustible gas, and more particularly to such a burner in which air is mixed with the combustible gas before it is discharged from the burner to produce and maintain the heating flame. This application is a division of my application Serial No. 141,423 filed May 8, 1937, now Patent No. 2,228,296.

It is an object of the invention to provide an improved burner of this type having a primary air shutter which can be easily adjusted and which will require a minimum amount of attention.

The above and other objects and advantages of the invention will become apparent from the following description taken in conjunction with the accompanying drawing forming a part of this specification, and of which Fig. 1 is a vertical sectional view of a gas burner embodying the invention; Fig. 2 is a sectional view taken on line 2—2 of Fig. 1; and Fig. 3 is a vertical view of a burner, partly in section, illustrating a modification of the invention.

Referring to Fig. 1, the improved burner embodying the invention includes a body member 10 having a threaded opening 11 which is adapted to be connected to a conduit of a gas supply line. The opening 11 communicates with a chamber 12 which in turn communicates with a passage 14 through an orifice 15. The flow of gas through orifice 15 is controlled by a valve 16 which forms part of a safety cut-off mechanism to be described hereinafter.

The passage 14 is in line with the opening 11 and the right hand end thereof is permanently sealed with a plug 17. The opposite end of passage 14 intersects a passage 18 which is threaded at its lower end to receive an adjustment screw 19. The passage 18 is sealed with a removable cap screw 20. By removing the cap screw 20 the adjustment screw 19 may be set to any desired position opposite the passage 14 to determine the maximum flow of gas to the burner and hence the maximum size of the burner flame.

The adjustment screw 19 is recessed at both ends and provided with a small central opening 21 intermediate the recessed ends, so that the gas pressure in the upper part of passage 18 can be measured at any time by removing cap screw 20 and securing a manometer to the lower threaded end of passage 18. When the gas pressure is not at the desired value, the adjustment screw 19 may be moved to reduce or increase the flow of gas into the passage 18.

To the upper end of passage 18 is secured a member 22 having a passage 23 which converges and terminates in a discharge orifice 24. Within the passage 23 is provided a plug 25 having grooves 25'. The grooves 25' are at an angle with respect to the direction of gas flow whereby a whirling motion is imparted to gas flowing upward in passage 23. The gas discharged from orifice 24 passes into a mixing chamber 26 formed in the lower end of a burner tube 27 which is threadedly secured to the body member 10 and concentric with respect to the passage 18 and orifice 24.

The lower end of burner tube 27 is provided with a plurality of ports or openings 28 to admit primary air into chamber 26. The primary air and gas, which is introduced into chamber 26 with a whirling motion, are thoroughly mixed in the chamber to provide a combustible gas mixture. Above the air inlet openings 28 the burner tube 27 slopes inward for a short distance, as indicated at 29, and then slopes outward gradually toward the upper end which is provided with a cap 30 having a plurality of openings 31. The gas mixture formed in chamber 26 flows upward through the burner tube 27 and is discharged at the openings 31 at which region the burner flame is produced and maintained.

A tube 32 concentrically disposed about the burner tube 27 is secured by a cap screw 32' to the top of body member 10. The tube 32 provides an enclosed space about the burner tube 27 so that primary air introduced into chamber 26 through the openings 28 must be drawn downward from the upper open end of tube 32. By terminating the upper end of tube 32 closely adjacent to the openings 31 in cap 30, the direction of flow of air drawn downward in tube 32 is reversed considerably due to the fact that the flow of air is upward about the burner flame, as indicated by the arrows in Fig. 1. With this arrangement particles of dust and lint in the air tend to move upward about the burner flame and are separated from air which is drawn downward within tube 32. The tube 32, which may be referred to as a dust prevention tube since it insures delivery of clean primary air into the mixing chamber 26, is described more fully in Forberg Patent No. 2,069,062.

Within the tube 32 is arranged a sleeve 33 having an inward extending flange 34 at its lower end. The sleeve 33 is vertically movable within

tube 32 by a member 35 which is secured thereto and extends outward in a vertical slot or opening 36. A spring clip 37, which is secured to the sleeve 33 and frictionally engages the inside of tube 32, is provided to maintain the sleeve 33 in any desired vertical position. The sleeve 33 constitutes an air shutter for controlling the quantity of primary air admitted into the mixing chamber 26. When the sleeve is in the position shown in Fig. 1, the flange 34 is substantially opposite the upper end of the inward sloping portion 29 of the burner tube 27, so that the maximum amount of primary air is admitted past the burner tube 27 and flange 34 into the mixing chamber 26. As the sleeve 33 is moved downward the amount of primary air admitted into the mixing chamber 26 is reduced due to the narrowing of the opening between the flange 34 and sloping portion 29 of the burner tube 27. When the flange 34 is in the position indicated in dotted lines in Fig. 1, a minimum amount of primary air is admitted into chamber 26 through the openings 28.

If for any reason the burner flame is extinguished it is desirable to shut off the flow of gas to the burner. This is accomplished by providing a safety cut-off mechanism including the valve 16 in chamber 12. The valve 16 is of the ball type and is urged to its closed position by a coil spring 38 which is maintained in position within the recess of a cap screw 39. The lower enlarged head of a pin 40 bears against the valve 16 to move the latter to its open position against the action of coil spring 38. The pin 40 extends upward through an opening 41 in the body member 10 and the upper end thereof may be threadedly secured to a push button 42. The push button is movable in a hollow sleeve 43 which may be formed integrally with the body member 10. A suitable packing 44 is provided about the pin 41 at the lower end of sleeve 43 to prevent leakage of gas through the opening 41. Between the push button 42 and packing 44 is arranged a coil spring 45 which tends to move the pin 40 upward and thereby permit valve 16 to move to its closed position.

To maintain valve 16 in its open position during operation of the burner, the push button 42 is provided with an annular groove 46 to receive an outward extending bent end of a bimetallic strip 47. The lower bent end of the strip 47 extends through an opening 48 in the tube 32. The strip 47 extends upward within the tube 32 and is secured intermediate its ends at 49 to the upper part of tube 32. A portion of the sleeve or air shutter 33 is cut away, as shown most clearly at 50 in Fig. 2, to permit free radial movement of the strip 47. From the tube 32 the strip 47 extends upward into the vicinity of the burner flame. The upper end of strip 47, which serves as a heat conductor, may be plated with a suitable metal having a greater resistance to corrosion than the metals used in forming the bimetallic strip. Instead of plating the upper projecting end of strip 47, a suitable piece of metal 51 having a high resistance to corrosion may be secured thereto. To prevent flow of heat from the strip 47 to the tube 32 suitable insulating material 52 is provided at the region where the strip is secured to the tube 32.

The operation of the burner and safety device just described is substantially as follows: To start the burner the push button 42 is pressed downward to move valve 16 to its open position. This permits gas to flow from chamber 12 through orifice 15, passages 14, 18, and 23, and discharge orifice 24 into the mixing chamber 26. In chamber 26 the gas is mixed with primary air which is admitted through openings 28 and controlled by the sleeve or air shutter 33. The gas mixture flows upward through burner tube 27 and openings 31 at which region the gas mixture is ignited to provide the burner flame. The upper projecting end of strip 47 is heated by the burner flame, and, when the strip is sufficiently heated, the lower part thereof wil be flexed outward and the bent lower end will extend into the grooved portion 46 of push button 42, as shown in Fig. 1. When this occurs the push button 42 may be released and valve 16 will remain in its open position.

If for any reason the burner flame is extinguished the bimetallic strip 47 will no longer be heated, whereby the lower part of the strip will be flexed inward and release the push button 42. With the extreme lower end of strip 47 no longer extending into the grooved portion 46 of push button 42, the coil spring 45 will be effective to move pin 40 upward and coil spring 38 will cause valve 16 to move to its closed position and completely shut off the flow of gas to the burner.

The construction of the burner and safety cut-off mechanism is such that a simple and compact structure is provided which will occupy a minimum amount of space. In starting the burner it is only necessary to press the push button 42 and then ignite the gas mixture at the openings 31. After a short interval of time the push button may be released when the strip 47 has deflected outward into the grooved portion 46 of the button. Since the bimetallic strip 47 is located within the tube 32 it is well protected. Only a relatively few parts are required to provide the burner since the mixing chamber 26 forms part of the burner tube 27 and the latter is so shaped that the sloping wall portion 29 thereof cooperates with the air shutter 33 to control the amount of primary air admitted into the mixing chamber. A burner of the character described is particularly adapted for heating absorption refrigeration apparatus, for example, since the burner needs only a minimum amount of attention.

The modification shown in Fig. 3 is similar to the embodiment just described and differs therefrom only in the provision of a second safety valve which cooperates with the safety valve 16 to prevent leakage of gas from the body member 10. In this modification a valve seat 53 is provided at the orifice 41 through which the lower reduced portion of pin 40' extends. The region of pin 40' where it becomes larger in diameter serves as a valve 54 which cooperates with the seat 53. The pin 40' is provided with a flange 55 at its upper end, and between this flange and packing 44' is arranged a coil spring 45'. The push button 42' is provided with a flange 56 and is recessed to receive a coil spring 57 which bears against the flange 55 of the pin 40'. The push button 42' is retained in position within sleeve 43 by a member 58 which is threadedly secured to the upper end of the sleeve and through which the upper part of the push button extends.

The operation of the burner and safety mechanism shown in Fig. 3 is substantially the same as that described above in connection with the embodiment illustrated in Figs. 1 and 2. When push button 42' is pressed downward to open valve 16 and instigate operation of the burner,

the valve **54** is moved to its closed position on the seat **53**. In addition to the packing **44'**, therefore, additional safety is provided by the closing of valve **54** so that no leakage of gas will occur from the body member **10** through the orifice **41**. When valve **16** is moved to its open position the downward force exerted by coil spring **57** must overcome the upward force exerted by coil springs **45'** and **38**. By providing the push button **42'** with the coil spring **57**, the button may be pressed downward a little more than is actually necessary to open valve **16**, whereby the lower bent end of bimetallic strip **47** will readily enter the space above the flange **56** and prevent upward movement of the push button when it is released.

Although particular embodiments of the invention have been shown and described, it will be apparent that modifications and changes may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. In a gas burner, structure providing a mixing chamber and a burner tube projecting therefrom, said mixing chamber having a gas inlet opening and air inlet openings, a casing around said mixing chamber and burner tube and spaced therefrom to form therewith a passage for flow of air to said inlet openings, said structure having an exterior sloping wall portion which with said casing so forms a part of said passage that the cross-sectional area thereof varies in the direction of air flow therethrough, and a shutter member in said part of said passage and movable substantially parallel with said direction of air flow to adjust rate of flow of air in said passage.

2. In a gas burner, structure providing a mixing chamber and a burner tube projecting therefrom, said mixing chamber having a gas inlet opening and air inlet openings, a casing around said mixing chamber and burner tube and spaced therefrom to form therewith a passage for flow of air to said inlet openings, said structure having an exterior sloping wall portion which with said casing so forms a part of said passage that the cross-sectional area thereof varies in the direction of air flow therethrough, and a shutter member slidably mounted on said casing and having a portion thereof extending toward said sloping wall and movable relative to said sloping wall to adjust the rate of flow of air in said passage.

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