Sept. 15, 1942. H. E. HANDLEY 2,295,784

GAS BURNER

Filed July 27, 1938 4 Sheets-Sheet 1

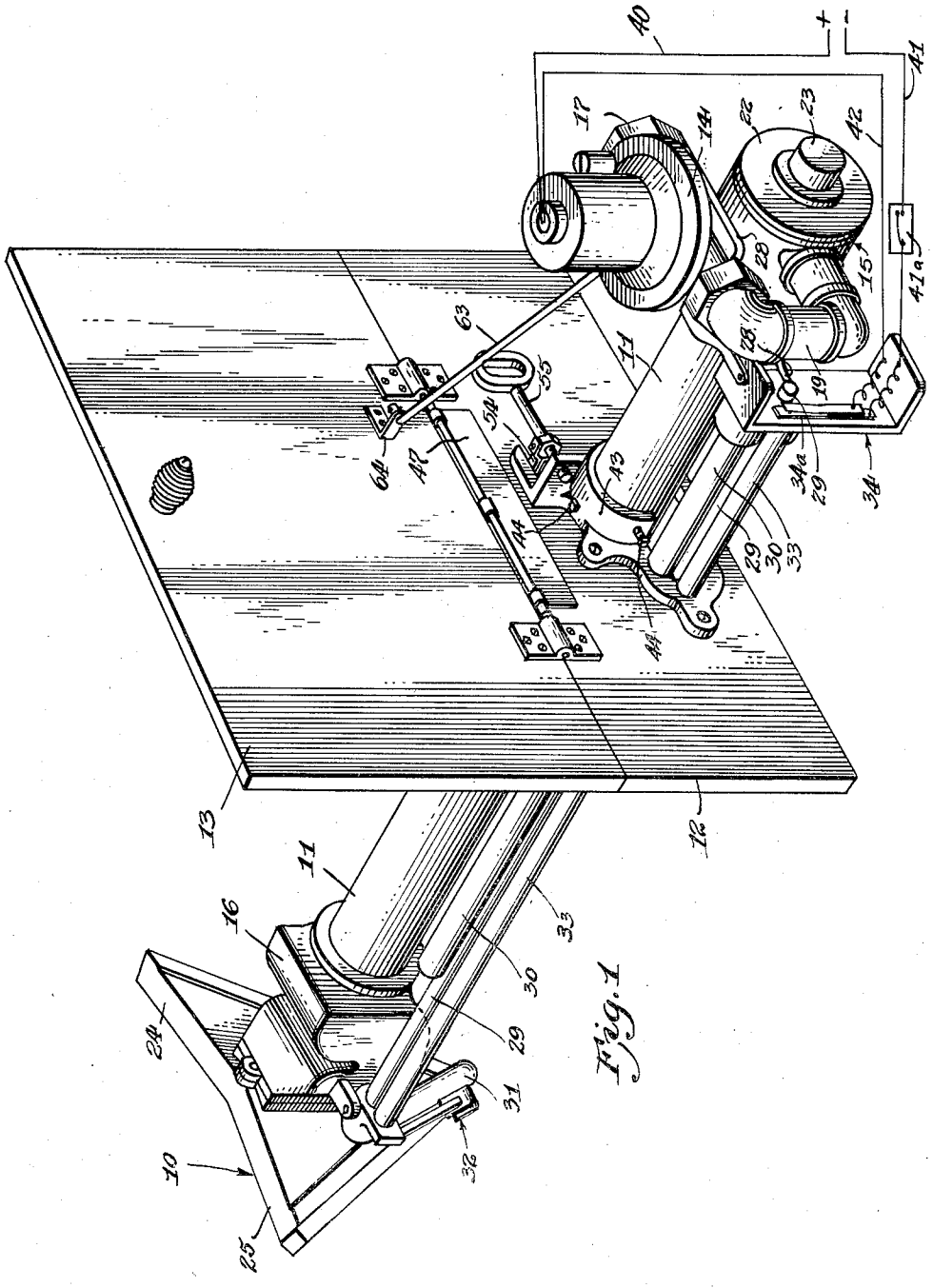

Fig. 1.

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Fig. 2

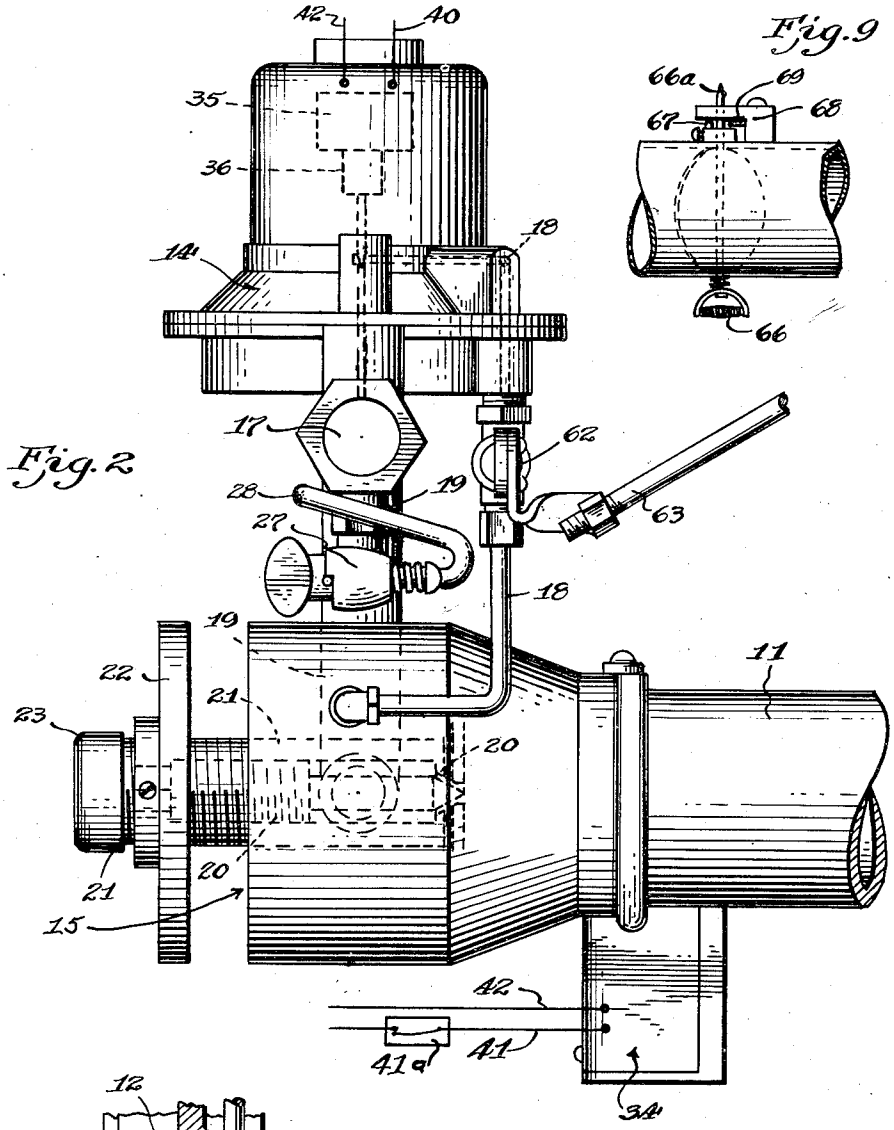
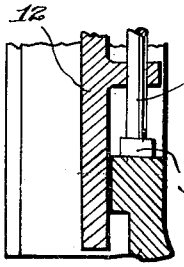


Fig. 9

Fig. 4



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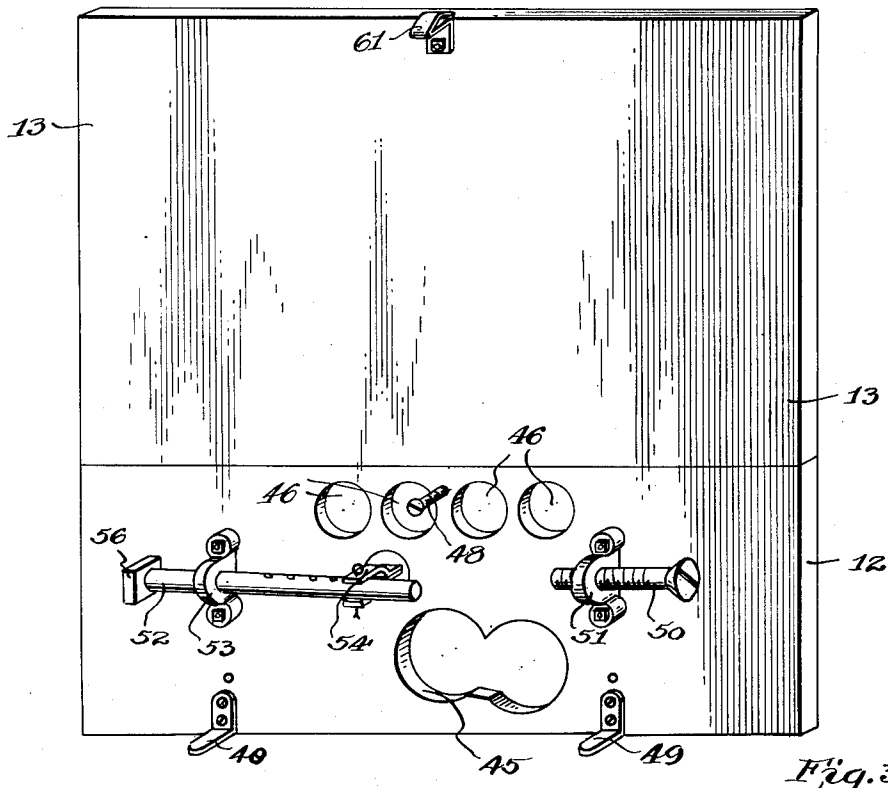

Fig. 3

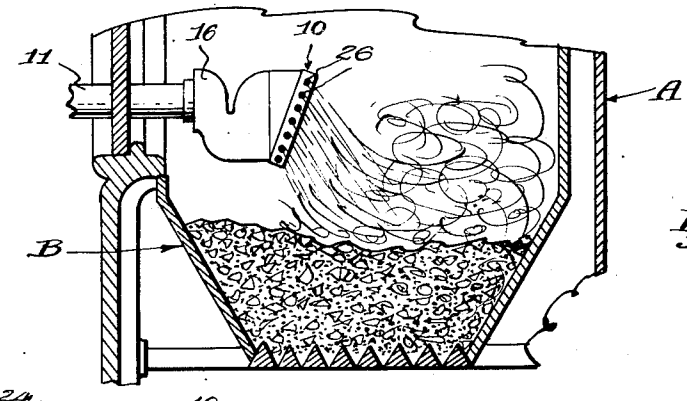

Fig. 5

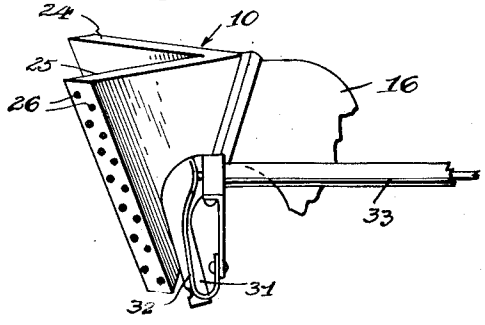

Fig. 6

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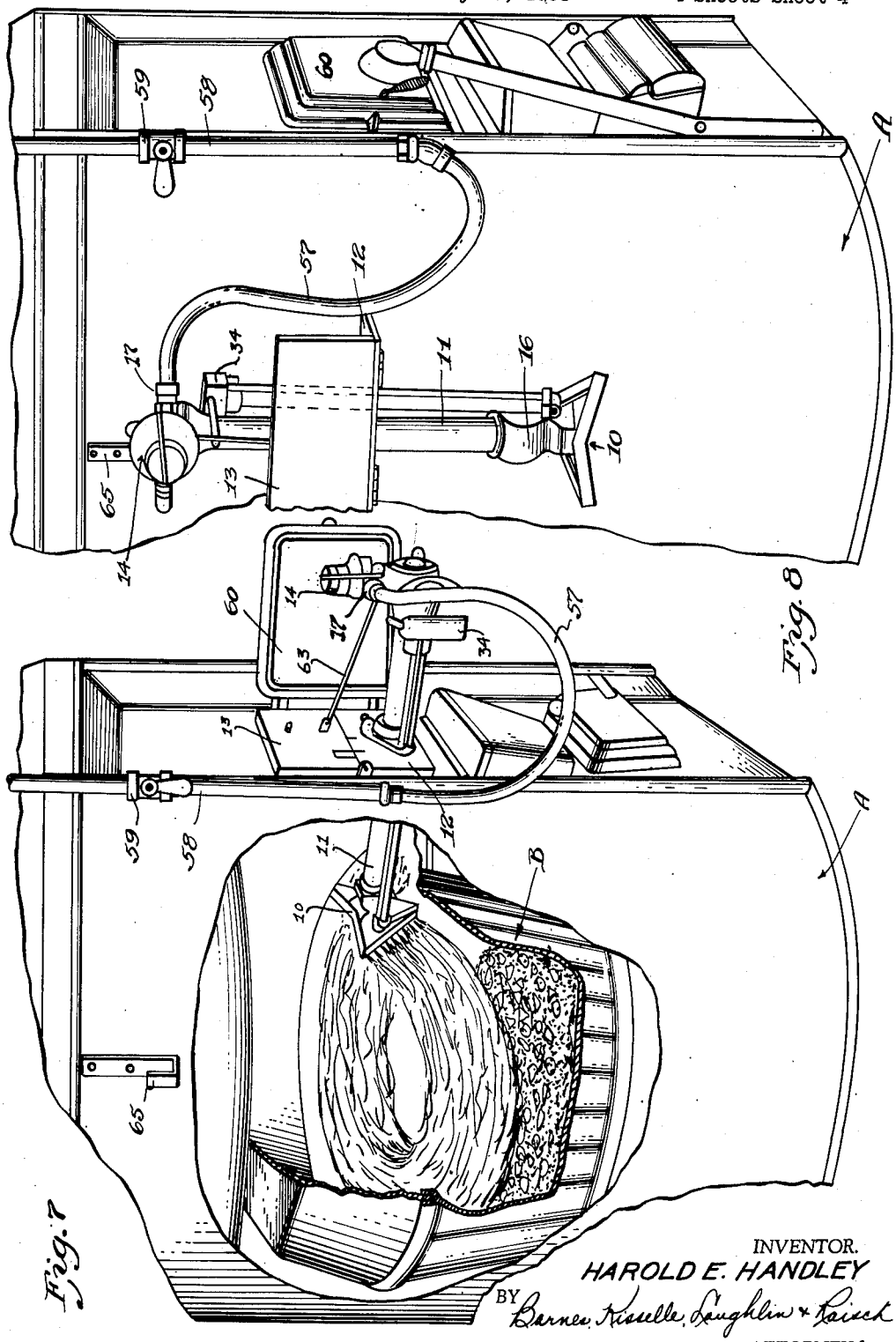

Fig. 8

Fig. 7

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UNITED STATES PATENT OFFICE

2,295,784

GAS BURNER

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Application July 27, 1938, Serial No. 221,469

7 Claims. (Cl. 158—7)

This invention relates to a gas burner for use in heating plants.

This invention is more particularly related to what may be called a gas conversion burner which is adapted to be used in connection with a regular central house heating plant especially during those months when a continuous fire is not needed and the firing of solid fuels becomes troublesome and inefficient.

An object of the present invention is to provide a gas burner which may be installed or removed at will by the householder with a minimum amount of trouble on his part, and without the necessity of detail knowledge of gas burners and gas combustion.

A further object of the invention is to provide a burner which may be adjusted for maximum combustion efficiency and which is so arranged that the householder may readjust it to the same position when converting his heating plant from a solid fuel burner to a gas burner. A further object of the invention is to provide a burner which has a burner head so designed that the application of heat to the furnace is most beneficial.

An additional object of the invention has to do with the details of the design of the burner head used and also with the arrangement of a pilot light and thermostatic control which will permit opening of the main gas inlet only at specified times. Additional safety features have to do with an arrangement whereby the pilot light only may be lighted when the auxiliary closure member for the furnace door is not in closed position.

Other features and objects of the invention have to do with retails of construction which permit the burner to be used with any type of heating plant without the necessity of drilling and tapping numerous holes and fitting each particular burner to an installation. Another important feature has to do with the adjustability of the burner head which permits one burner assembly to be adaptable to various sized heating plants.

Other features and objects of the invention have to do with details of construction and operation which will be set forth in the following specification and claims.

In the drawings:

Fig. 1 is a perspective view of the burner assembly illustrating the various details thereof.

Fig. 2 is a side view of certain of the safety arrangements in connection with the burner gas supply.

Fig. 3 is an illustration of the reversed side of the auxiliary closure member showing the mechanism for holding the same in a furnace opening.

Fig. 4 is a detail partial section showing the manner in which the closure member engages the furnace opening.

Fig. 5 illustrates a side view of the burner head.

Fig. 6 illustrates the burner head with the thermostatic arrangement and pilot light.

Fig. 7 is a cut away view of the furnace showing the gas burner in operation, particularly the action of the flame.

Fig. 8 illustrates the gas burner in storage position.

Fig. 9 is an illustration of a damper setting mechanism which permits a predetermined adjustment to be maintained.

Referring to the drawings, in Fig. 1, the main elements of the assembly are shown. They consist of a burner head 10, a supply pipe 11, a closure member comprising a stationary portion 12 and a movable portion 13, and a valve 14 for controlling the inlet of gas to the supply pipe. Fig. 7 illustrates the relation of the burner assembly to a furnace A having a fire-pot B.

We consider first the details of the burner arrangement in connection with a safety thermostatic control and pilot valve. The supply pipe 11 is a hollow tube which is provided at its outer end, Figs. 1 and 2, with a mixing chamber 15, and at its inner end with a distributing housing 16 upon which is mounted the burner head 10. A gas inlet is shown at 17 and this inlet is the entrance to the control valve 14 which is a constant bleed type of valve. This constant bleed valve is of the type in which a diaphragm controls a valve member to open and close a passageway extending through the valve. A chamber is provided above the diaphragm which is normally open to the gas in the valve inlet and which is bled through a separate passageway 18 to the mixing chamber 15. If, for any reason, this passageway 18 is closed, pressure will build up above the diaphragm and cause the gas to be cut off. Since this type of valve is well known in the art, it has been considered unnecessary to illustrate the details thereof.

A pipe 19 leads from the outlet of the valve 14 to the mixing chamber 15 (Fig. 2). A needle valve 20 is threaded into an inlet housing 21 within the mixing chamber to regulate the flow of gas from the pipe 19 to the mixing chamber 15 and the pipe 11. The inlet housing 21 extends beyond the end of the mixing chamber 15 and is threaded so that a shutter plate 22 may be ad-

justably positioned thereon to control the inlet of primary air to the mixing chamber and supply pipe. A cap 23 covers the end of the extension 21 and may be removed to permit adjustment of the needle valve 20.

Consider now the burner head 10. It will be seen that the burner head is substantially triangular in shape with the apex of the triangle at the bottom and the base of the triangle at the top in a substantially horizontal position. The burner may perhaps best be described by referring to it as two triangular wing portions 24 and 25 which spread from a common side at the center and point away from the pipe 11. Each outer edge of the wing portions 24 and 25 which slants down toward the apex of the triangle, is provided with apertures or burner ports 26 where the flame of the gas burner originates. Referring to Fig. 5, it will be seen that the burner may also be inclined in such a way that it slants back from the top to the bottom when viewed from the side. The resulting flame from the burner is shown in Fig. 7. It will be seen that the flame flows around the fire-pot and wipes the sides thereof in more or less of a horseshoe form. This insures most efficient use of gas which is burned.

Referring to Fig. 2, it will be seen that a valve 27 is positioned directly beneath the inlet 17 of the main valve 14. This is a pilot gas shut-off valve and is open to the inlet 17. Leading therefrom is a tube 28 which connects with a pipe 29 positioned substantially parallel with the pipe 11. The pipe 29 and the tube 28 are connected by a small valve (not shown) which permits adjustment of the pilot light. A tube 30 furnishes primary air for the pilot light. Extending downward from the forward end of the pipe 29 is a pilot tube 31, at the lower end of which is a pilot flame port, which is positioned substantially at the apex of the triangular burner head 10 (see Fig. 6). A thermostatic unit 32 is positioned directly adjacent the pilot tube 31 and it is so arranged that a movable rod in a tube 33 will actuate a switch 34*a* in a control box 34 to open or close the same depending on the position of the thermostatic unit 32.

In the top of the valve 14 is located a thermostatic snap disc unit 35, Fig. 2, which actuates a normally spring closed valve 36 in the bleed line 18. The snap disc is heated by a small electric coil, (not shown). These units are known as "Klixon" units and are well known in the art. When the snap disc is actuated, that is, connected with the current, the valve 36 in the bleed line 18 will be open, and consequently gas may flow through the valve 14. An electric conduit 40 connects one pole of the snap disc unit 35 with one pole of an electrical source, and conduits 41 and 42 lead from another pole of an electrical source through the switch 34*a* in the control unit 34 to the other pole of the snap disc unit in the valve 14. A room thermostat 41*a*, shown diagrammatically, is also interposed in the line 41. When the pilot is lighted, the thermostatic unit 32 will be expanded by the heat thereof and the switch 34*a* will be closed. If room temperature is down so that the thermostat 41*a* is calling for heat, the switch in the unit 41*a* will be closed. Electric current will then actuate the snap disc unit 35 and valve 36 in the valve 14 and open the bleed line 18 so that pressure will not develop above the diaphragm in the valve 14 to close the valve. Gas may then pass through the valve 14 to the mixing chamber 15 and the supply pipe 11. If the pilot light goes out it will be impossible to light the burner head 10 since the switch 34*a* will be open and the bleed line 18 will consequently be closed by the valve 36. Pressure then develops above the diaphragm in the valve 14 to close the same. Similarly, when room temperature rises to a point where the switch in the thermostatic unit is opened, the bleed line 18 will be closed and gas is no longer furnished to the burner head.

Consider now the mounting of the burner assembly in the furnace. The door panel member which is adapted to serve as an auxiliary closure for the normal opening in the furnace A consists, as previously indicated, of a stationary portion 12 and a portion 13 hinged thereon. Door panels may consist of flat pieces of fireproof material suitably adapted to this use. On the door piece 12 is mounted a flange 43 having apertures for receiving the supply pipe 11 and the auxiliary pipes 29, 30 and 33. Set screws 44 are tapped in the flange 43 to lock the pipe 11 in the proper position, Fig. 8. A figure-8 opening 45 is shown in Fig. 3 to permit the pipes to pass therethrough. Apertures 46, shown in Fig. 3, are covered by a movable secondary air door 47 which may be adjusted in various positions by a screw 48.

Brackets 49 are shown at the bottom edge of the door piece 12 and these are adapted to rest upon the lower edge of the furnace door opening. A screw 50 extending through a lug 51 is adapted to be positioned to contact one side of the furnace door opening. Substantially aligned with this screw 50 is a short rod 52 slidable in a guide 53. A lever 54 is pivoted in the flange 43 and extends therethrough to the other side (see Figs. 1 and 3). This lever 54 is adapted to be controlled by a thumbscrew 55 and is attached at its inner end to the bar 52 so that, by moving the thumbscrew 55, a contact block 56 at the end of the rod 52 may be moved toward or away from the edge of the door piece 12. The contact block 56 is adapted to abut the side of the furnace door opening so that when the thumbscrew is turned to its tightened position, the two brackets 49 will be resting on the lower edge of the door opening, the head of the screw 50 will contact one side edge of the door opening and the block 56 will be pressed firmly against the other side of the door opening (see Fig. 4). The closure member is thus held in place by frictional contact with edges of the door opening. Once the piece 12 of the closure member is fastened securely in the furnace opening, the set screws 44 may be loosened and the burner head may be adjusted to its proper position in the furnace by moving pipe 11 in or out and re-tightening the set screws 44.

In Fig. 7 the burner assembly is shown in its operative position. A flexible hose 57 connects the inlet 17 with a gas pipe 58 in which is located a shut-off valve 59. With the burner assembly in position, it will be seen that a regular door 60 of the furnace A is ajar.

To permit lighting of the pilot, the piece 13 is hinged to the piece 12 so that it may be opened outward to permit access to the inside of the furnace. A spring clip 61 serves to keep the door portion 13 in closed position.

Referring now to Fig. 2, it will be seen that in the bleed line 18 is a valve 62 from which extends a safety shut-off rod 63. This rod is pivotally fastened to an angle 64 on the face of the door 13, (Fig. 1). When the door 13 is opened outwardly, the movement of the rod 63 actuates the valve 62 to close the bleed line 18. As previ-

ously described, the closing of the bleed line 18 will cause pressure to build up above the diaphragm of the valve 14 so that valve 14 will be closed thus cutting off gas to the burner. Consequently, when the door 13 is open, it will be possible to light the pilot flame but there will be no danger of the main flame lighting at the same time.

In Figs. 7 and 8, a hook 65 is shown on the outside of the furnace to permit hanging of the entire burner assembly on the furnace A when it is not in operation.

In Fig. 9 is illustrated a portion of the chimney flue in which the damper is located. A handle 66 controls the damper. On the damper rod 66a is a lug 67, which is adjustable. On the pipe is a fixed lug 68 having a portion 69 for contacting the lug 67. When the burner is installed the lug 67 is positioned so that when the damper is moved to a position where lug 67 contacts the portion 69, the damper is in the proper position for gas burning.

When the householder desires to convert his furnace from a solid fuel burner to a gas burner, he first rakes the fire-pot B to cover the grates with a fairly thick layer of ashes. The burner assembly is then inserted into the furnace opening and the panel 12 secured therein by tightening the thumbscrew 55. Next the damper handle 66 is turned so that the lug 67 contacts the lug 69. The damper will then be adjusted for gas burning.

The valve 59 may now be turned on, the door 13 opened and the pilot tube 31 lighted. In order to light the pilot, it will be necessary to make sure that no ashes contact the lower portion of the burner head 10. When the pilot is lighted, the door 13 may be closed. As soon as the thermostat unit 32 becomes heated by the pilot light, the switch 34a will be closed. If the room thermostat 41a is also cold, the thermostatic snap disc unit 35, controlling the valve in bleed line 18, is actuated so that bleed line 18 will be open. Gas may then pass through the valve 14 to the mixing chamber 15 and the burner head 10 where it will be ignited to form a sweeping flame as shown in Fig. 7.

What I claim is:

1. A gas burner assembly to be used in connection with the fire-box of a building heating unit including an auxiliary closure member for the fire-box opening of said heating unit which comprises a stationary portion adapted to be temporarily and removably mounted in said fuel opening by a thumbscrew operated mechanism, a movable door portion mounted adjacent said stationary portion adapted to open to permit access to the interior of said heating unit, and a gas burner comprising a supply pipe passing through and adjustably mounted in said stationary portion of the closure member connected at its outer end to a combustible gas supply and having a burner outlet member formed at the inner end thereof.

2. A gas burner unit to be used in a building heating device which comprises an auxiliary closure member for the normal fuel opening of said unit, means on said closure member for removably locking said closure member in the normal opening of said heating device comprising a member for abutting one side of said opening, and a member movably positioned on said closure member whereby it may be moved into contact with another side of said opening to frictionally position said closure member therein, and a burner unit projecting through and supported in said closure member.

3. A gas burner unit to be used in a building heating device which comprises an auxiliary closure member for the normal fuel opening of said unit, means on said closure member for removably locking said closure member in the normal opening of said heating device comprising members movably positioned on said closure member and adapted to contact opposing sides of said opening to frictionally position said closure member in said opening, and a means on the outside face of said closure member operably connected with at least one of said movably positioned members to move the same toward and away from a side of said opening, and a burner unit projecting through and supported in said closure member.

4. A gas burner unit to be used especially for light loads in a building heating device which comprises an auxiliary closure member for the normal fuel opening of said unit, means on said closure member for removably locking said closure member in the normal opening of said heating device comprising members for abutting the lower edge of said opening to position said closure member vertically, a member for abutting one side of said opening, and a member movably positioned on said closure member whereby it may be moved into contact with another side of said opening to frictionally position said closure member therein, and a burner unit projecting through and supported in said closure member.

5. In a gas burner conversion unit adapted to temporary use in a solid fuel heating unit, a supply pipe, a support therefor, and a triangularly shaped burner head mounted on said pipe having one horizontal side and two vertically disposed sides and having gas outlets formed in the vertically disposed sides thereof, whereby a gas flame may be directed around the sides of a firepot in said heating unit.

6. In a gas burner conversion unit adapted to temporary use in a solid fuel heating unit, a burner member projected through and supported by the walls of said heating unit comprising a burner head formed as a triangularly shaped piece including two wings inclined forwardly from the center of said head and provided with burner ports at the outer edges thereof whereby a gas flame may be directed around the sides of a firepot in said heating unit.

7. In a gas burner conversion unit adapted to temporary use in a solid fuel heating unit, a burner member projected through and supported by the walls of said heating unit comprising a triangularly shaped piece mounted with an apex of said triangle pointing downward and formed of two wings inclined forwardly from the center of said piece and provided with burner ports at the outer edges thereof adjacent the lower apex whereby a gas flame may be directed around the sides of a firepot in said heating unit.

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