April 27, 1954 L. C. BIGGLE 2,677,004

THERMOELECTRIC GENERATOR AND PILOT BURNER ASSEMBLY

Filed July 20, 1951 2 Sheets-Sheet 1

FIG. 1.

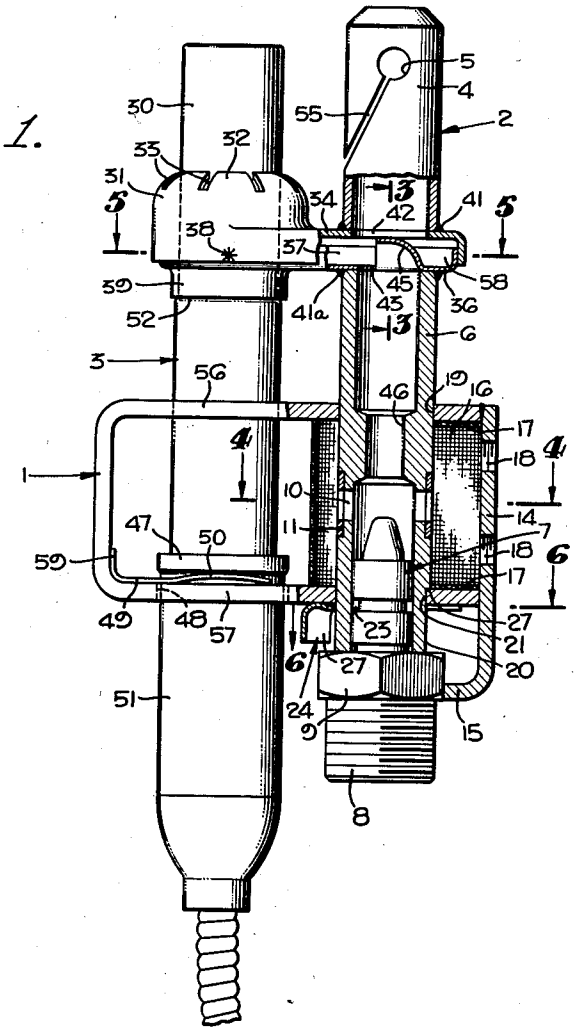
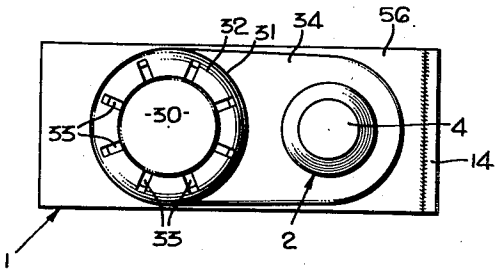


FIG. 2.



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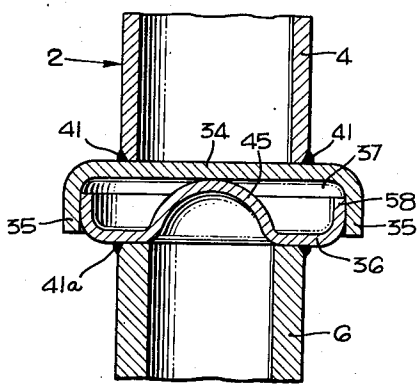


FIG. 3.

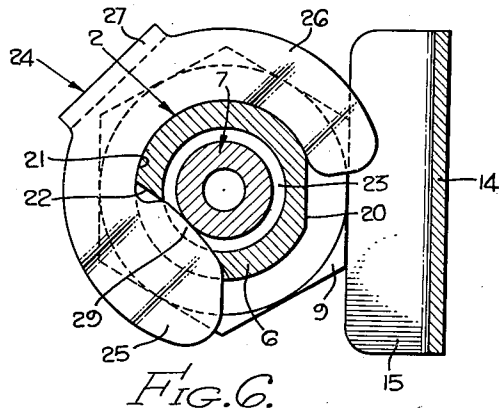


FIG. 6.

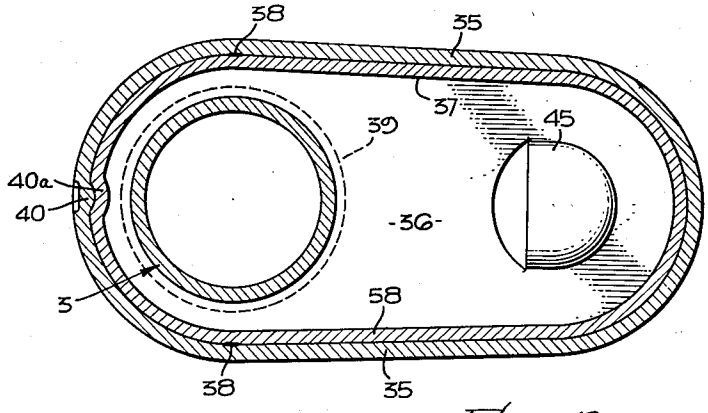


FIG. 5.

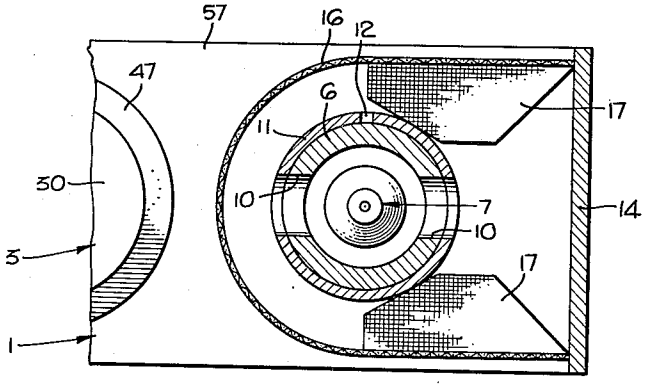


FIG. 4.

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UNITED STATES PATENT OFFICE

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THERMOELECTRIC GENERATOR AND PILOT BURNER ASSEMBLY

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Application July 20, 1951, Serial No. 237,797

7 Claims. (Cl. 136—4)

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This invention relates to pilot burners for igniting a main burner, and more particularly to the assembly, with such a burner, of a thermoelectric generator.

Generators of this character, responding to the existence of a flame at the pilot burner, are now in common use for controlling the flow of fuel to the main burner. These generators include "hot" and "cold" junctions of thermoelectrically dissimilar materials, the hot junctions being heated by a flame that is in existence only when the pilot flame is lighted. In order to multiply the effect of the thermoelectric generator, a plurality of pairs of such couples may be joined in series or parallel. A safety valve structure is so arranged that, when the hot junction or junctions cool, the valve closes, preventing flow of fuel to the main burner.

It is one of the objects of this invention to provide a simple and effective structure for maintaining the thermoelectric generator in proper operative relation to the pilot flame.

It is another object of this invention to provide a simple, detachable mounting for the pilot burner and the generator with respect to a supporting bracket in order to permit ready inspection, renewal, cleaning, or repairs.

This invention possesses many other advantages, and has other objects which may be made more clearly apparent from a consideration of a form in which it may be embodied. This form is shown in the drawings accompanying and forming part of the present specification. It will now be described in detail for the purpose of illustrating the general principles of the invention; but it is to be understood that such detailed description is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

Referring to the drawings:

Figure 1 is an elevation, partly in section, of a pilot burner generator assembly incorporating the invention;

Fig. 2 is a top plan view thereof;

Figs. 3, 4, 5, and 6 are enlarged sectional views, taken along planes corresponding to lines 3—3, 4—4, 5—5, and 6—6 of Fig. 1.

In the present instance, a bracket 1 (Figs. 1, 2, and 4) is provided for supporting a pilot burner 2 and a generator 3. This bracket has upper and lower legs 56 and 57. A pilot burner 2 is arranged to be placed adjacent a main burner for the purpose of igniting it whenever fuel is passed to the main burner. For this purpose, the pilot burner structure has an upper head 4 provided with

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diametrically opposite jet openings 5, or other types of openings, from which a flame may issue.

The tubular head 4 forms an extension of a lower tubular member 6. Near the bottom of this lower tubular member 6, a fuel inlet jet structure 7 is provided. This jet structure is telescoped within the lower end of the tube 6. The jet structure 7 carries a threaded extension 8 for connection to a source of gaseous fuel. This extension also has a hexagonal portion 9.

Air for providing a combustible fuel mixture is supplied through a pair of radial apertures 10 (Figs. 1 and 4) disposed at about the exit end of the jet structure 7. These apertures 10 may be controlled by an air shutter ring 11. This air shutter ring 11 is provided with apertures capable of being aligned with aperture 10. However, by angularly positioning the ring 11 about the axis of the tube 6, the extent of opening of the apertures 10 may be controlled. As shown most clearly in Fig. 4, ring 11 is slit at 12 and is made of spring material in order that, in this way, it may be sprung into the annular groove provided around the tube 6.

The air and fuel are mixed within tube 6 as they rise through the narrow portion 46 of the tube 6.

The bracket 1 is shown as welded to a strap support 14 having a narrow flange 15 (Figs. 1 and 6). The strap 14 is provided with appropriate means for attaching it to a stationary support, as for example, the threaded apertures 18. The edge of the flange 15 restrains turning of the threaded extension 8 by contacting a flat face of the hexagon 9. Accordingly, a gas connection can be quite readily made to the jet structure 7.

The bracket 1 may, if desired, serve as a support for a metal air screen 16. This metal air screen is shown to best advantage in Fig. 4. It has inwardly directed portions 17 contacting the inner surfaces of the legs 56 and 57 of the bracket 1.

The tubular member 6 passes freely through an aperture 19 in the upper leg 56 of the bracket 1. The lower portion of the tubular member 6 has a flat portion 20 (Fig. 6) to correspond with the shape of an aperture 21 in the lower leg of the bracket 1. This portion forms a shoulder 27 (Fig. 1) adapted to rest on the upper surface of leg 56. In this way, the tubular member 6 can be assembled with the bracket in only one way.

The tubular member 6, as well as the jet member 7, are detachably supported by the lower leg 57 of bracket 1. For this purpose, the tubular member 6 has an arcuate slot 22 (Fig. 6) which extends through the tubular member 6, and is

aligned with the annular groove 23 formed in the jet member 7. A keying spring lock member 24 (Figs. 1 and 6) has an arm 25 which passes through the slot 22 and into the annular groove 23. The opposite arm 26 closely embraces the tubular member 6. The member 24 is provided with a downwardly extending handle member 27. The arms 25 and 26 are slightly bowed downwardly away from the lower surface of the bracket 1. The spring retaining clip 24 has its upper surface in close proximity to the lower surface of the bracket 1. Due to the bowed configuration of the arms 25 and 26, the tubular member 6 is urged downwardly until the shoulder 27 (Fig. 1) contacts the upper surface of the lower arm of bracket 1.

As shown most clearly in Fig. 6, the arm 25 of the retaining clip 24 has an inwardly projecting inner edge 29 that is engaged between the sides of the annular groove 23 in the jet member 7. Furthermore, the handle member 27 for the manipulation of this spring clip 24 is angularly arranged to place it in a convenient position for manipulation by an operator. The clip has sufficient inherent resiliency to be snapped into and out of engaging position.

An auxiliary burner structure is provided for heating the upper cylindrical controller 30 of the pilot gas burner. This upper cylindrical end is in the form of a metallic sheath through which heat may be transmitted in a well understood manner to the hot junctions of the thermocouples within the generator 3. Such a generator is described in Patent No. 2,407,517, issued September 10, 1946, to William A. Ray.

The burner, in this instance, includes an annular member 31 through which the cylindrical member 30 may readily project. This annular member has an inwardly directed arcuate flange 31 provided with radial slots 33. These radial slots 33 define, with the exterior cylindrical surface of the member 30, a series of jet openings.

The member 31 is provided with a hollow extension 34 (Fig. 1). This hollow extension has a downwardly directed edge or flange 35 (Fig. 3). Telescoped within this edge 35 is the upwardly turned edge 58 of a lower member 36 (see, also, Fig. 5). These telescoping edges form a complete perimeter for the upper and lower members 34 and 36. They thus define a fuel passage 37 which is in communication with the interior of the tubular pilot burner 2 in a manner to be hereinafter described.

The extension 34 and the member 36 are welded toegther at spots indicated by the heavy lines 38 in Fig. 5 and by the cross 38 in Fig. 1. Furthermore, a lower hub member 39 is formed integrally with the member 36 for telescoping over the tubular portion 30 of the pilot generator 3. The extension 34 is furthermore joined to the lower member 36 by the upset portions 40 and 40a (Fig. 5) formed in the extension 34 of the lower member 36. The parts 31, 34, and 36 thus constitute the auxiliary burner for the generator 3.

Members 34 and 36 are interposed between the upper tubular head 4 and the lower tubular member 6. The tubular member 4 is welded, as indicated by reference character 41, to the upper surface of the extension 34. The lower surface of the member 36 is similarly welded, as indicated by reference character 41a, to the upper end of the tube 6.

Through apertures 42 and 43 (Figs. 1 and 5) are disposed in the extension 34 and in the member 36. In this way, fuel can pass from the jet 7 upwardly into the hollow head 4, as well as through the passageway 37, to the auxiliary burner 31. Furthermore, in order to deflect the fuel from the inner mixing chamber formed in the tubular member 6 through the extension 34, the edge of the aperture 43 may be raised to define a deflector 45. Accordingly, the fuel mixture obtained above the restricted passage 46 in the tubular member 6 passes partially to the auxiliary burner 31 and partially through the apertures 43 and 42 to the burner top 4.

Ignition of burner gas at the slots 33 of the auxiliary burner is effected by passage of fuel through the slot 55 (Fig. 1) from the jet opening 5 of the pilot burner 2.

The pilot generator 3 is shown as having a shoulder 47 (Figs. 1 and 4) which may be passed through a clearance aperture 48 in the lower leg 57 of bracket 1. A spring clip 49, similar in structure to spring clip 24, has forked, bowed arms 50 embracing the lower portion 51 of the pilot generator 3. The arms 50 urge the pilot generator upwardly against the lower shoulder 52 of the auxiliary burner 31. A handle 59 for manipulating clip 49 is provided. For convenience of operation, the clip 49 may be placed at any desired angle with respect to the axis of generator 3, so as to bring handle 59 to a manipulable position.

Renewal or removal of the pilot generator 3 is readily effected by removing the spring clip 49 and withdrawing the pilot generator from the auxiliary burner 31—34—36 and through the opening 48.

The pilot burner structure 2 can be similarly independently removed by removing clip 24 and moving the tubular member 6 upwardly, and correspondingly moving the annular member 31 upwardly off the pilot generator 3. The jet member 7 is freed from the lower end of tubular member 6 when the spring clip 24 is removed and, therefore, does not prevent upward movement of the tubular member 6 with the associated auxiliary burner structure.

The inventor claims:

1. In a pilot burner generator assembly: a bracket; a generator supported by the bracket; a pilot burner also supported by the bracket, said pilot burner having means forming a fluid passageway; an auxiliary burner for the generator mounted on the pilot burner for heating the generator; and an extension for the auxiliary burner carried by the pilot burner intersecting said fluid passageway and forming an auxiliary gas passage from the pilot burner passageway to the auxiliary burner.

2. In a pilot burner generator assembly: a bracket; a generator supported by the bracket; a pilot burner also supported by the bracket, said pilot burner having means forming a fluid passageway; an auxiliary burner for the generator mounted on the pilot burner for heating the generator; and means intersecting said fluid passageway and forming an auxiliary gas passage between the auxiliary burner and the pilot burner passageway, said means including a deflector located in said pilot burner passageway.

3. In a pilot burner generator assembly: a bracket; said bracket having a pair of through apertures; a generator detachably mounted in one of the apertures; a pilot burner detachably mounted in the other aperture, said pilot burner having means forming a fluid passageway; an auxiliary burner carried by the pilot burner for

heating the generator; and means intersecting said fluid passageway forming an auxiliary gas passage from the pilot burner passageway to the auxiliary burner.

4. In a pilot burner generator assembly: a bracket; said bracket having a pair of through apertures; a tubular generator passing through one of the apertures, and having a shoulder adjacent the edge of the said one aperture; a spring clip engaging the shoulder for detachably connecting the generator to the bracket; a pilot burner passing through the other aperture, and having a shoulder adjacent the edge of said other aperture; said pilot burner having means forming a fluid passageway; a spring clip engaging the shoulder of the pilot burner for detachably connecting the pilot burner to the bracket; an auxiliary burner having means forming a through port substantially aligned with said one aperture, said generator being guidingly received in said port forming means, said generator defining with said port forming means an annular space, said port on one side thereof opening around said generator; and means mounting said auxiliary burner and defining a gas passage from the interior of the pilot burner passageway to the annular space, and mounted on the pilot burner.

5. In a pilot burner generator assembly: a pilot burner having means forming a fluid passageway; a hollow member attached to the pilot burner, said member at one end intersecting said fluid passageway to form an auxiliary passageway, said member having a through port at the other end in fluid communication with said one end; a pilot generator extending through the port, there being an annular space around said generator formed by said hollow member and said generator respectively; and means detachably securing said generator to said pilot burner.

6. In a pilot burner generator assembly: a pilot burner having means forming a fluid passageway; a hollow member extending transversely of said pilot burner, and extending into said fluid passageway; said member having means forming an opening thereto from said passageway, said member also having a deflector for guiding fuel from said passageway into said hollow member; said member having a through port at a place on said member exterior of said pilot burner; a pilot generator extending through the port, there being an annular space around said generator formed by said hollow member and said generator respectively, said annular space communicating with said opening forming means; and means detachably securing said generator to said burner, said generator being otherwise slidable through said port.

7. In a pilot burner generator assembly: a substantially U-shaped bracket having a first pair of aligned apertures through the legs of said bracket, and a second pair of aligned apertures through the legs of said bracket; an elongate generator extending through said first pair of apertures, at least one of the apertures of said first pair guidingly receiving said generator; clip means detachably mounting said generator to said bracket; an elongate pilot burner extending through said second pair of apertures, at least one of the apertures of said second pair guidingly receiving said pilot burner; said pilot burner having a fluid passageway; means detachably mounting said pilot burner to said bracket; and a hollow member attached to the pilot burner, said member at one end intersecting said fluid passageway to form an auxiliary passageway, said member having means forming a through port at the other end in fluid communication with said one end, said port being substantially aligned with said first pair of apertures; said generator extending through said port forming means, said generator being movable out of engagement from said member upon detachment of said generator from said bracket, said port forming means defining an annular space around said generator, said space opening on one side of said port around said generator to form an auxiliary burner.

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