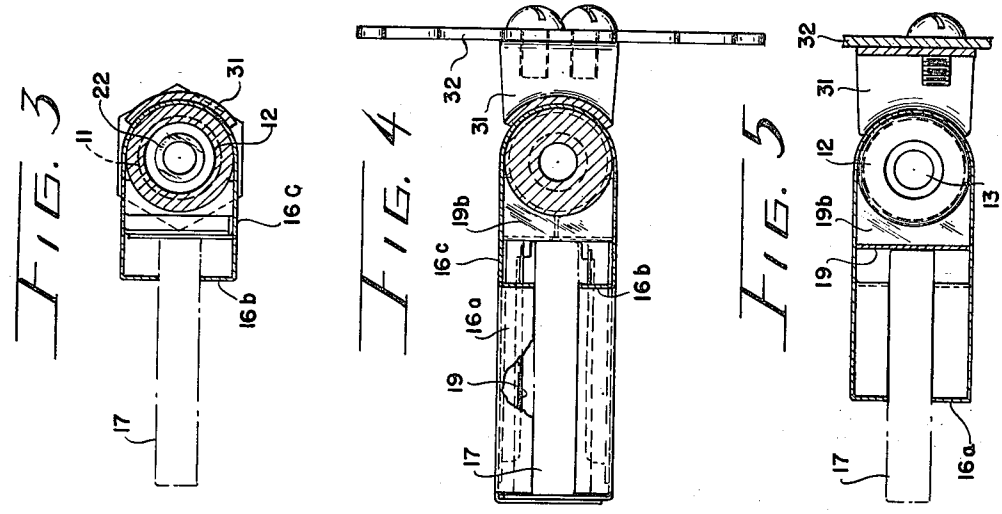
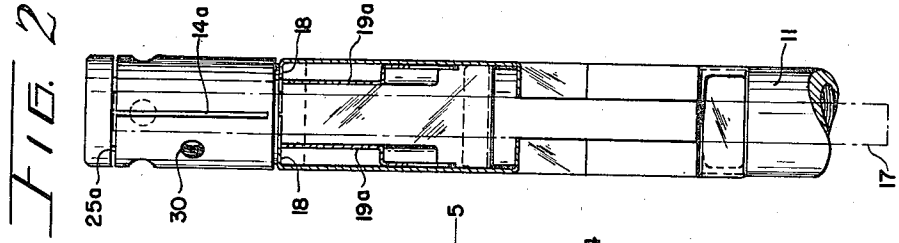
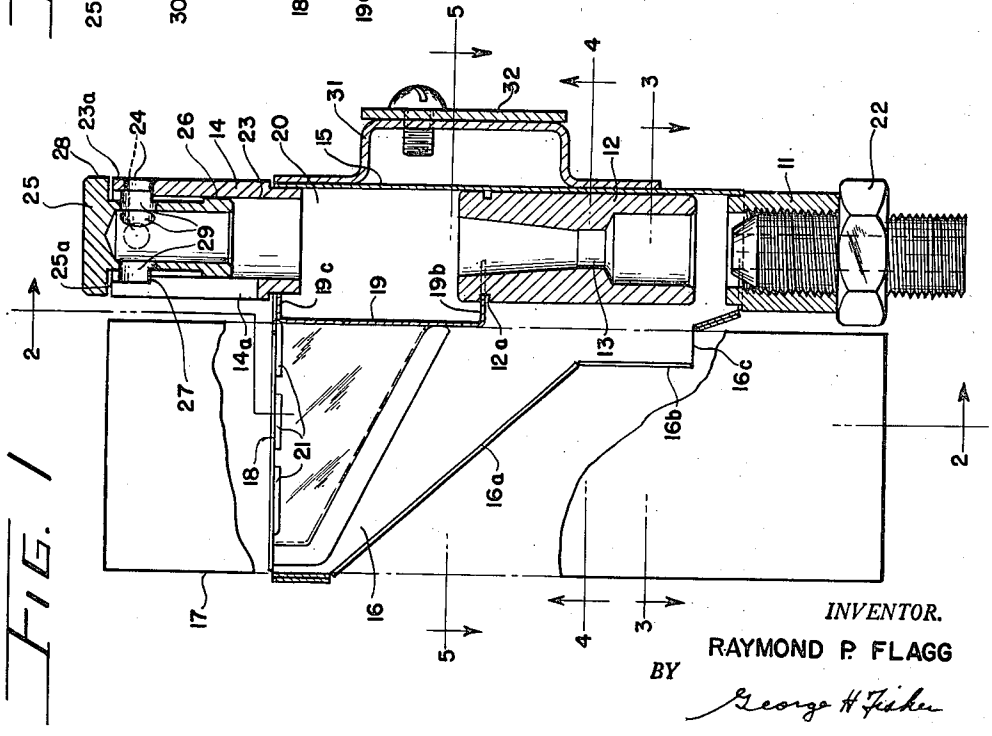
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THERMOELECTRIC GENERATOR

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INVENTOR.
RAYMOND P. FLAGG
BY
George H. Fisher
ATTORNEY

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THERMOELECTRIC GENERATOR

Raymond P. Flagg, Moundsview Township, Ramsey County, Minn., assignor to Minneapolis-Honeywell Regulator Company, Minneapolis, Minn., a corporation of Delaware

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This invention relates to thermoelectric generators and, more specifically, it relates to a combination of a thermopile and a pilot burner for use with a main burner of a furnace.

The problems of linting of burner orifices and of providing pilot burners that have orifices so positioned that they may be used satisfactorily on different types of furnaces, have for many years been one of the major concerns of the gas heating industry. Heretofore, frequent service calls have been necessary to clean the burners of accumulated lint, and installation and service companies have been required to stock numerous types of pilot burner tips or heads in order to have one which would suit a particular installation.

It is therefore one of the objects of the present invention to provide a thermoelectric generator with burners that do not lint up anywhere nearly as much as the prior art burners, due to the positioning of a primary and secondary air opening with respect to the burners.

Another object of the invention is to provide an inexpensive pilot burner generator that produces a high E. M. F. for the amount of gas consumed.

A further object of the invention is to provide a thermoelectric generator wherein a burner has a plurality of orifices which may be selectedly used by a simple adjustment of the burner tip.

A still further object of the invention is to provide a pilot burner having adjustable means therein for selectively determining which of a plurality of angularly arranged orifices is or are to be used.

A further object of the invention is to provide a thermoelectric generator wherein a flame runner slot extends from burner orifices intermediate the ends of the burner to a plurality of selectively useable orifices arranged around the upper end of the burner.

Still further objects of the invention will become apparent upon reading the following detailed description of the invention in conjunction with the accompanying drawing wherein:

Figure 1 is a vertical cross-section of the thermoelectric generator with the thermopile shown partly broken away;

Figure 2 is a vertical sectional view taken along line 2—2 of Figure 1;

Figure 3 is a horizontal sectional view of the generator taken along the line 3—3 of Figure 1;

Figure 4 is a horizontal sectional view taken along line 4—4 of Figure 1 but looking upwardly of the generator towards the burner head; and

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Figure 5 is a horizontal sectional view taken along line 5—5 of Figure 1 and looking downwardly on the generator.

As can be best seen in Figure 1 of the drawing, the burner portion of the thermoelectric generator is formed of an internally threaded sleeve-like bottom member 11, an intermediate sleeve 12, having a constricted throat portion 13, and a burner head portion 14 that are rigidly held together in spaced and aligned relationship by means of a formed sheet of metal 15. The sheet partially encircles portions of said members and extends transversely to one side of the burner to form a channel portion 16 to receive and encase a thermopile 17. The portion 16 has integral and inwardly extending flange portions 18 which cooperate with a generally U shaped conduit member 19 with legs 19a to form gas passages communicating with a chamber 20 between the members 12 and 14. The member 19 has a sealing arm portion 19b which engages in an annular groove 12a half way around the member 12 and similarly has a portion 19c which engages half of the circumference of the lower end of the member 14. Elongated notches 21 or other suitable openings in the upper end of the arm 19a form orifices for directing flames along the side of the thermopile 17 to heat the so-called hot junction end thereof. Inwardly extending flanges 16a and 16b are adapted to engage the sides of the thermopile 17 to provide with those sides an upwardly extending air passage from a non-flanged lower end 16c between members 19a and the thermopile, to provide secondary air for the flame produced at orifices 21. The opening between the pile and the end 16c is substantially in alignment with the lower end of the member 12 so that some of the air entering the opening may be drawn by the aspirating effect of a nozzle or spud 22 directing gas upwardly and axially into the throat portion 13 of the member 12. Inasmuch as a far greater amount of the air entering the opening at 16c is flowing in a vertical direction, the smaller amount of air which is deflected from said path of flow transversely and slightly downwardly into the lower end of the member 12, will be substantially free of small particles of lint and dust which will be carried by their own inertia and the much larger mass of air upwardly through the secondary air passage to the burner orifices 21 where they will be burned or carried on out with the products of combustion.

The burner head or tip 14 has a stepped bore 23 therein that has the larger inner diameter

portion 23a at the upper end thereof. The tip also has radial bores 24 therein for directing the main burner igniter flame or flames in a desired direction. A rotatable plug 25 has an annular rib at the lower end thereof which snugly engages the lower portion of the bore 23 and an annular rib 27 spaced downwardly a short distance from a headed portion 28. The diameter of the rib 27 is such as to snugly engage in the enlarged bore portion 23a and is apertured at 29 to provide two diametrically opposed openings and one at a 45 degree angle to the axis of the diametrically opposed openings so as to permit selective use of one or a pair of the openings 24 by rotating the plug 25 for aligning the 45 degree hole in the member 25 with one of the holes 24 or by aligning the diametrically opposed holes 29 with diametrically opposed holes 24 in the member 14. A set screw (not shown) may be used in the threaded hole 30 to frictionally engage the plug 25 to lock it in its adjusted position. The position of the lower edge of the rib 27 is such as to engage the lower end of the recess 23a to cause the head 28 to be positioned a slight distance from the upper end of the member 14. It is thus seen that gas entering the lower end of the member 14 can reach the longitudinally extending flame runner slot 14a and the annularly disposed slot 25a by passing directly to the slot 14a from the lower end of bore 23 and to the slot 14a and annular slot 25a through the openings 29 to the space between the plug 25 and the member 14. Therefore, no matter what annular relationship the plug 25 has with respect to the member 14, a runner flame will extend from a point adjacent the burner orifices 21 longitudinally of the burner and around the burner to whatever opening 24 is being used.

For mounting the generator on a main burner or an associated part of the furnace, a bracket 31 is welded or otherwise suitably secured to the member 15 and is bolted or otherwise secured to a mounting plate 32.

As illustrated in Figure 1 of the drawing, the generator is adjusted for only the right hand orifice 24 to provide a flame for igniting a main burner, which would naturally be positioned to the right of the burner as viewed in Figure 1. Gas issuing from the spud 22 will pick up primary air from the opening 16c and direct a mixture of gas and air into the chamber 20. From there the mixture will pass transversely through the channels 19a to the burner orifices 21 and to the pilot burner through the members 23, plug 25, orifice 29 and orifice 24 and runner slots 14a and 25a. This will enable the thermopile 17 to be heated on opposite sides thereof by ribbon like flames issuing from the orifices 21 and supported by secondary air flowing to these flames from surrounding external air as well as air passing up through the passages formed by the portion 16 and the thermopile casing.

It is thus seen that with the above described simple construction it is possible, with the proper selection of burner arrangement, to make a pilot generator installation which will require very little servicing, due to the non-linting thereof, as well as enable the installation of the burner without requiring the installer to stock a large number of different types of burner tips.

As other modifications of the invention may be made without departing from the spirit of the invention, it is to be understood that the scope of the invention is to be determined solely from the appended claims.

I claim:

1. A thermoelectric generator comprising a burner having a first body portion with a nozzle therein, a second hollow body portion in alignment with but spaced from said first body portion to provide for the aspirating of air into said second body portion by the flow of gas from said nozzle, an encased thermocouple unit, a burner tip, and a supporting and connecting member engaging said first and second body portions and said tip and said thermocouple unit so as to hold them in assembled relationship, said member having an opening therein adjacent the lower edge of said second body portion and being formed with gas passages and orifices therein extending from said second body portion along opposite sides of said unit for directing flames on said unit, and forming with said unit air passages extending from said opening upwardly between said unit and said member to provide primary air at said nozzle and secondary air at said orifices.

2. A thermoelectric generator comprising a burner having a first body portion with a nozzle therein, a second hollow body portion in alignment with but spaced from said first body portion to provide for the aspirating of air into said second body portion by the flow of gas from said nozzle, an encased thermocouple unit, and a supporting and connecting member engaging said first and second body portions and said thermocouple unit so as to hold them in assembled relationship, said member having a horizontally spaced opening therein adjacent the lower edge of said second body portion and being formed with gas passages and orifices therein extending from said second body portion along opposite sides of said unit for directing flames on said unit, and forming with said unit air passages extending from said opening upwardly between said unit and said member to provide primary air at said nozzle and secondary air at said orifices.

3. A thermoelectric generator comprising a burner having a first body portion with a nozzle therein, a second hollow body portion in alignment with but spaced from said first body portion to provide for the aspirating of air into said second body portion by the flow of gas from said nozzle, a thermocouple unit, and a supporting and connecting member engaging said first and second body portions and said thermocouple unit so as to hold them in assembled relationship, said member having an opening therein near the lower edge of said second body portion and being formed with gas passages and orifices therein extending from said second body portion along opposite sides of said unit and forming with said unit air passages extending from said opening upwardly between said unit and said member to provide primary air at said nozzle and secondary air at said orifices.

4. A thermoelectric generator comprising a burner having a first body portion, a second hollow body portion in alignment with but spaced from said first body portion to provide for the aspirating of air into said second body portion by the flow of gas from said first body portion, a thermocouple unit, and a supporting and connecting member engaging said first and second body portions and said thermocouple unit so as to hold them in assembled relationship, said member having an opening therein substantially in the same plane as the lower edge of said second body portion and being formed with gas passages and orifices therein extending from said second

body portion along opposite sides of said unit and forming with said unit air passages extending from said opening upwardly between said unit and said member to provide primary air at said nozzle and secondary air at said orifices.

5. In a thermoelectric generator, the combination comprising a burner having a burner tip and a transverse opening intermediate its ends and a primary air inlet near the bottom thereof, and a thermocouple unit positioned to one side of said burner, said burner having upper and lower inwardly extending flanges on a loop portion encircling said thermocouple unit and said burner, conduits on opposed sides of said loop portion and communicating with said transverse opening for directing flames onto opposite sides of said unit and the upper flanges on said loop portion being spaced from said unit while the lower flanges engage said unit except for a short length thereof substantially in alignment with the primary air inlet in said burner.

6. In a thermoelectric generator, the combination comprising a burner having a burner tip and a transverse opening intermediate its ends and a primary air inlet near the bottom thereof, and a thermocouple unit positioned to one side of said burner, said burner having upper and lower inwardly extending flanges on a loop portion encircling said thermocouple unit and said burner, conduits on opposed sides of said loop portion and communicating with said transverse opening for directing flames onto opposite sides of said unit and the upper flanges on said loop portion being spaced from said unit while the lower flanges engage said unit except for a short length thereof substantially in alignment with the primary air opening in said burner and transversely spaced therefrom.

7. In a thermoelectric generator, the combination comprising a burner having a burner tip and a transverse opening intermediate its ends and a primary air inlet near the bottom thereof, and a thermocouple unit positioned to one side of said burner, said burner having a portion extending along the side of said thermocouple unit from said transverse opening for directing a flame onto a side of said unit and being spaced from said unit to provide a secondary air passage therebetween, said portion having a lower edge in engagement with said unit except for a short length thereof substantially in alignment with the primary air inlet in said burner to provide primary and secondary air for said primary air inlet and said burner portion.

8. In a thermoelectric generator, the combination comprising a burner having a burner tip and a transverse opening intermediate its ends and a primary air inlet near the bottom thereof, and a thermocouple unit positioned to one side of said burner, said burner having a loop portion encircling said thermocouple unit and said burner, a conduit on said loop portion communicating with said transverse opening for directing a flame onto a side of said unit, upper flanges on said loop portion being spaced from said unit to cooperate with said conduit in directing said flame and lower flanges on said loop engaging said unit except for a short length thereof substantially in alignment with the primary air inlet in said burner, to permit primary and secondary air to enter between said loop portion and said unit.

9. A pilot burner comprising a tubular body, the upper end of said body having an enlarged coaxial recess therein with a plurality of circumferentially spaced radial orifices extending from the bottom of said recess through the wall thereof, a laterally extending burner conduit having orifices therein and communicating with the center of said tubular body, a runner slot in said upper end of said body extending from the end thereof to a point adjacent said conduit orifices, an inverted cup-shaped plug having an enlarged head overlying the end of said body and forming an annular runner groove therewith, the lower end of said plug having an annular external sealing rib engaging the inner surface of said body, a second annular rib on said plug near the upper end thereof of a diameter substantially equal to the diameter of said enlarged recess, and a radial passage extending through said plug and second rib for selective alignment with said radial orifices and establishing communication between the interior of said burner body and said runner slot and groove.

10. A pilot burner comprising a tubular body, the upper end of said body having an enlarged recess therein with a plurality of circumferentially spaced radial orifices extending from the bottom of said recess through the wall thereof, a burner conduit extending laterally from the center of said body and having orifices therein, a runner slot in said upper end of said body extending from the end thereof to a point adjacent said conduit orifices, an inverted cup-shaped plug rotatably positioned within said body and having an enlarged head overlying the end of said body and forming an annular runner groove therewith, the lower end of said plug having an annular external sealing rib engaging the inner surface of said body above said conduit, a second annular rib on said plug near the upper end thereof of a diameter substantially equal to the diameter of said enlarged recess, and a radial passage extending through a wall of said plug and said second rib for selective alignment with said radial orifices and conducting gas from the center of said burner body to said runner slot and groove.

11. A pilot burner comprising a tubular body, the upper end of said body having an enlarged recess therein with a plurality of circumferentially spaced radial orifices extending from the bottom of said recess through the wall thereof, a burner conduit extending laterally from the center of said tubular body and having orifices therein, a runner slot in said upper end extending from the end thereof to a point adjacent said laterally extending burner conduit, an inverted cup-shaped plug having an enlarged head overlying the end of said body and forming an annular runner groove therewith and extending inwardly beyond said enlarged recess, the lower end of said plug having an annular external sealing rib engaging the inner surface of said body, a second annular rib on said plug near the upper end thereof of a diameter substantially equal to the diameter of said enlarged recess, and a radial passage extending through said second rib for selective alignment with said radial orifices and conduiting gas to said runner slot and groove.

RAYMOND P. FLAGG.

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