May 26, 1925. 1,539,477

J. H. GRAYSON

GAS HEATER

Filed March 11, 1924

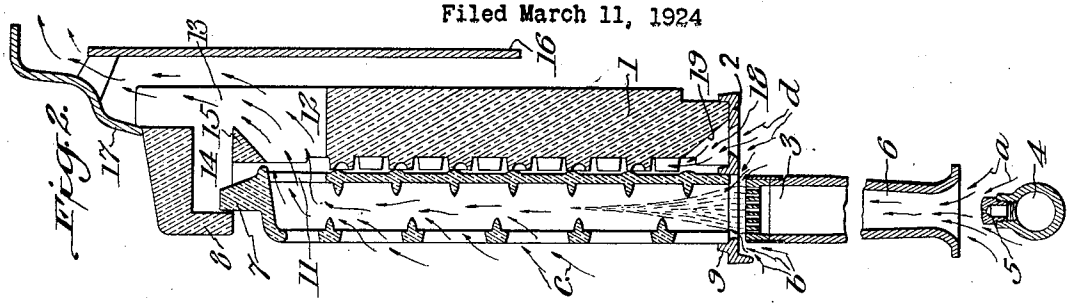


Fig. 2.

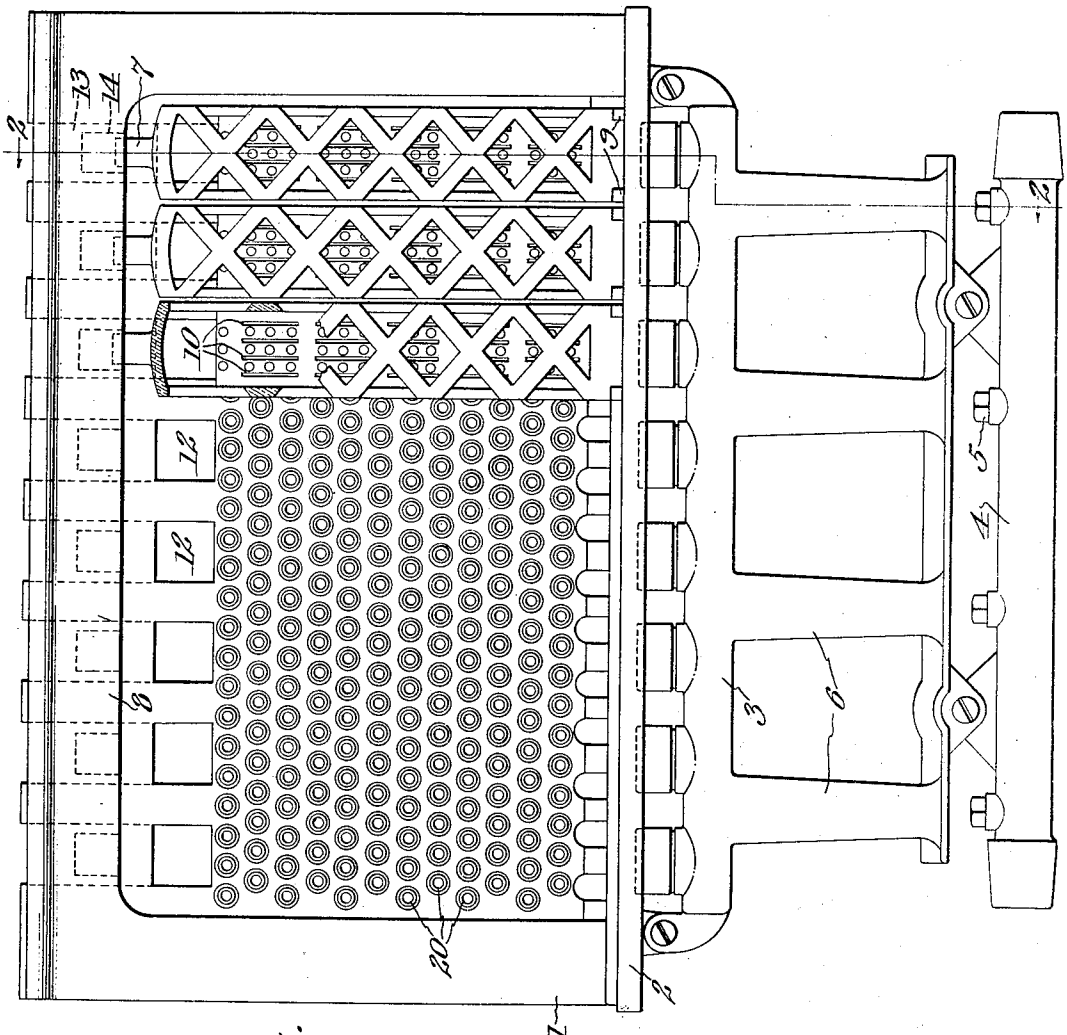


Fig. 1.

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UNITED STATES PATENT OFFICE.

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GAS HEATER.

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To all whom it may concern:

Be it known that I, JOHN H. GRAYSON, a citizen of the United States, residing at Athens, in the county of Athens and State of Ohio, have invented certain new and useful Improvements in Gas Heaters, of which the following is a specification.

This invention relates to gas heaters of the glower type and particularly to a heater which will insure a complete combustion of the gaseous fuel.

While gas heaters of the glower type are sometimes arranged to discharge the products of combustion through a flue or chimney, the heaters are more often used without flues and the products of combustion are discharged into the room. As the B. T. U. standard of the gas, either manufactured or natural, may vary over a considerable range, carbon monoxide may pass into the room, due to an increase in the B. T. U. standard after the burner nozzle has been adjusted for satisfactory operation at a given B. T. U. content. As gas manufacturers increase the B. T. U. standard of their product at certain times of the year without notice to the public, some of the reported fatalities from asphyxiation have undoubtedly arisen from the failure of poor radiant heaters to effect complete combustion when the B. T. U. standard of the gas varied.

An object of the invention is to provide a flueless gas heater of the glower type which will be flexible in operation, i. e. it will insure complete combustion, although the B. T. U. standard of the supplied gas varies over a wide range. A further object of the invention is to provide a gas heater of the glower type which will insure a surplus of air over that necessary to effect complete combustion. A further object of the invention is to provide a gas heater of the glower type in which secondary air is supplied in such quantity as to insure perfect combustion even though the burner nozzle is improperly adjusted for the gas supply.

An embodiment of my invention which will attain these objects is illustrated in the accompanying drawings, in which—

Fig. 1 is an elevation, partly in section, of a back brick, burner and glowers, and

Fig. 2 is a broken section on line 2—2 of Fig. 1 and with portions of the heater frame also shown.

In the drawings, the numeral 1 indicates the back brick which is mounted upon a plate 2, from which the burner manifold 3 is suspended. The burner manifold in turn acts as a support for the gas manifold 4, which is provided with nozzles 5 located below the tubes 6 of the burner manifold.

The glowers are provided with terminal lugs 7 which engage behind a depending flange 8 at the upper and outer edge of the fire brick 1, and the bottom ends of the glowers are held in place by projections 9 on the plate 2. The rear faces of the glowers are preferably slotted as at 10 and are provided with openings 11 which align with passages 12 extending through the fire brick. The passages 12 connect with recesses 13 which extend to the top of the fire brick and other passages 14 extend from the recess 13 at the level of the flange 7, leaving narrow reinforcing strips 15 between the passages 12 and 14. The strips 15 are preferably triangular, as shown, to permit the ready flow of the hot products of combustion through the rear of the fire brick. The back 16 is spaced from the rear of the fire brick and does not extend to the ornamental front 17, thus providing a space for the discharge of the hot gases into the room.

The rear portion of the plate 2 is provided with openings 18 in line with recesses or grooves 19 formed in the lower edge of the fire brick 1, and the face of the fire brick is provided with projections 20, which are preferably staggered and cupped, as described in my prior Patent No. 1,371,477.

The operation of the burner is as follows:—The nozzles 5 are preferably designed to secure the entrainment of sufficient primary air, as indicated by arrows *a*, to provide the necessary ratio for complete combustion. Secondary air passes into the base of the glowers, since the burner manifold 3 is suspended below the plate 2, and a further supply of secondary air enters the front of the glowers, due to suction set up by the rearward discharge of the hot gases through the openings 11 and passages 12, 13, these two currents of secondary air being indicated by the arrows *b*, *c*, respectively. An additional supply of secondary air mixes the hot gases as they pass through the openings 11, this supply comprising air which passes upwardly over the hot projections of the fire brick, as indicated by the arrows *d*. The secondary air which passes

over the fire brick 1 is highly heated and will readily combine with any unburned fuel which reaches the passage 12, since the fuel is also highly heated. Except under exceptional conditions, however, the secondary air which passes over the fire brick will not be needed to complete combustion, in view of the secondary air which enters at the base of the glowers and the additional supply which enters through the front of the glowers. To insure complete safety, however, this supply of air from the hot fire brick is desirable, since it will insure complete combustion even though the nozzle 5 is not suited for the gas being used. As stated above, the nozzle opening is preferably such that sufficient primary air enters the burner manifold to insure complete combustion of the gas normally supplied at a given locality, in which case each separate supply of secondary air adds a factor of safety insuring complete combustion when the B. T. U. standard is increased. Obviously, the nozzle opening may be such that some of the secondary air entering at the base of the glowers is needed to establish the normal ratio for complete combustion. Such practice, however, results in a lowering of the factor of safety and should be avoided, since it is possible, by careful design, to secure sufficient primary air at the base of the burner tubes to form the air-gas ratio required for the normal gas.

The invention is not limited to the specific embodiment herein described but contemplates any arrangement of a flueless heater of the glower type in which the supply of secondary air mixes with the hot gases before they escape from the highly heated portions of the heater. It will be apparent that many changes which may be made in the various parts, their relative size, shape and location fall within the scope of my invention, as set out in the following claims.

I claim:—

1. In a flueless heater of the glower type, a glower, a fire-brick having a passage through which hot gases pass from said glower before leaving the heater, and means for supplying secondary air to the hot gases as they leave said glower and in such quantity as to insure complete combustion.

2. In a flueless heater of the glower type, a firebrick, a glower in front of said firebrick and having an opening through its rear wall at the top thereof, a passage through the firebrick in alignment with said opening, means cooperating with said opening and passage to permit the escape of products of combustion into the room from the rear of the heater, and means for supplying secondary air at the entrance into said passage.

3. In a flueless heater of the glower type, a casing having a back wall and a top, the upper edge of said back wall being spaced from said top, a glower having an opening through its rear wall at the top thereof, a fire-brick spaced from said back wall and having a passage therethrough in alignment with the opening in said glower, whereby the products of combustion may pass through said fire-brick and escape into the room through the space between the rear wall and top of said casing, and means for supplying secondary air to the products of combustion as they leave said glower.

4. The invention as claimed in claim 3, wherein said means comprises grooves in the base of said fire-brick for admitting air between said fire-brick and said glower.

5. In a flueless heater of the glower type, a casing having a back wall and a top, the upper edge of said back wall being spaced from said top, a fire-brick spaced from said back wall, a glower having an opening through its rear wall at top thereof, a passage through said fire-brick in alignment with the opening in said glower, and means for supplying secondary air to the hot gases as they pass through the opening in said glower.

6. In a flueless heater of the glower type, a fire-brick having a front face provided with projections, a glower in front of said fire-brick and having an opening through its rear wall at the top thereof, a passage through said fire-brick in alignment with said opening, a recess on the rear face of said fire-brick extending from said passage to the top of said fire-brick and means at the base of said fire-brick for admitting air between said fire-brick and said glower.

7. In a flueless heater of the glower type, a fire-brick having a flange depending from its upper edge and having projections on its front face, a glower having an opening through its rear wall at the top thereof, a plate for supporting said fire-brick, projections on said plate for receiving the base of said glower, a passage through said fire-brick in alignment with the opening in said glower, an opening in said plate and under said fire-brick and a passage in said fire-brick establishing communication between the opening in said plate and the front face of said fire-brick, whereby secondary air may pass over the face of said fire-brick to mix with the hot gases as they pass out of said glower.

8. In a flueless heater of the glower type, a supporting plate, a fire-brick and a glower mounted on said plate, a burner carried by said plate and with its outlet spaced from said plate, an opening in the rear wall of said glower and a passage through said fire-brick whereby the products of combustion are discharged from the rear of the heater, and passages in said plate and the base of

said fire-brick for admitting air to the front face of said glower.

9. A fire-brick for use in a flueless heater of the glower type, said fire-brick having a front face provided with projections, a passage extending through said fire-brick near the top thereof, a recess on the rear face of said fire-brick extending from said passage to the top wall of the fire-brick, and grooves in said fire-brick at the base thereof, said grooves extending from the front to the bottom wall of said fire-brick.

In testimony whereof, I affix my signature.

JOHN H. GRAYSON.