J. RUBADO.

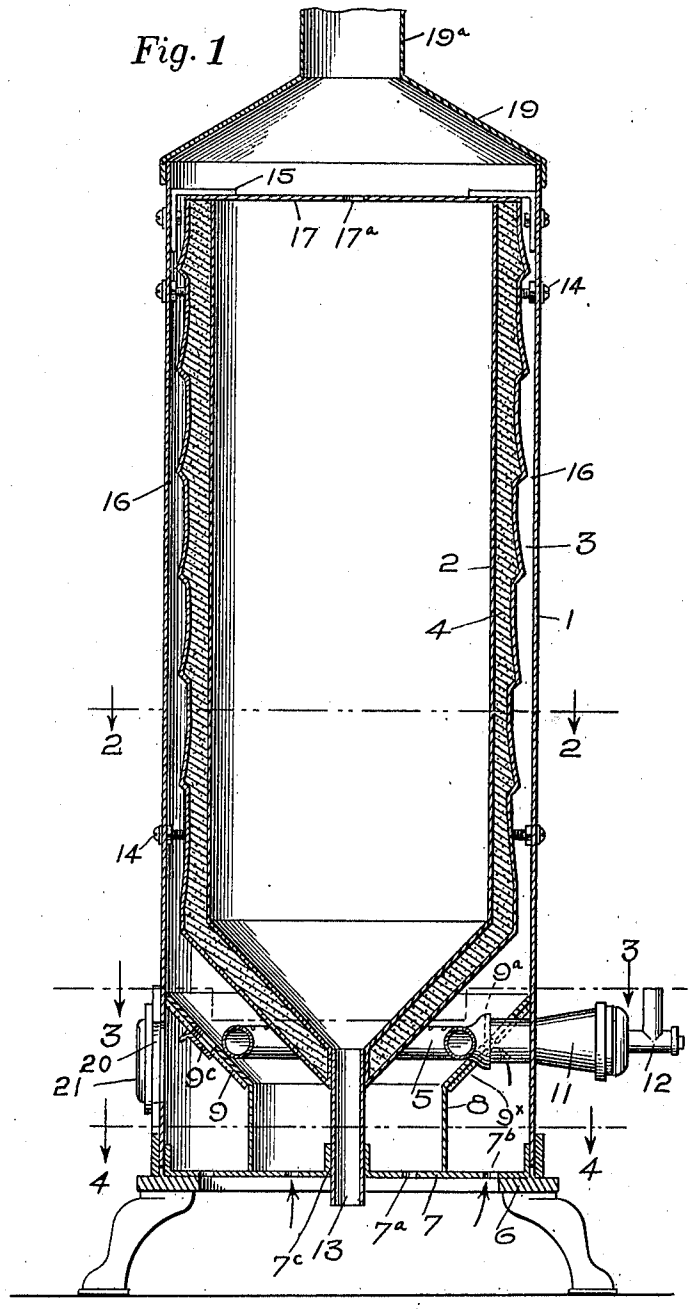
GAS HEATER.

APPLICATION FILED DEC. 24, 1909.

982,879. **Patented Jan. 31, 1911.**

2 SHEETS—SHEET 1.

Fig. 1



WITNESSES:

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2 SHEETS—SHEET 2.

Fig. 2

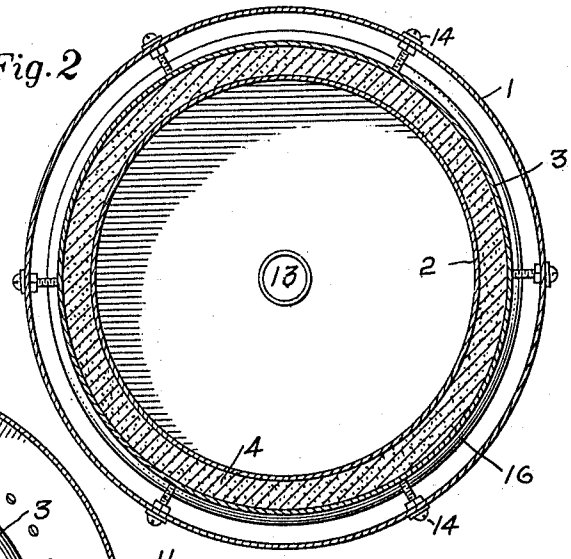


Fig. 3

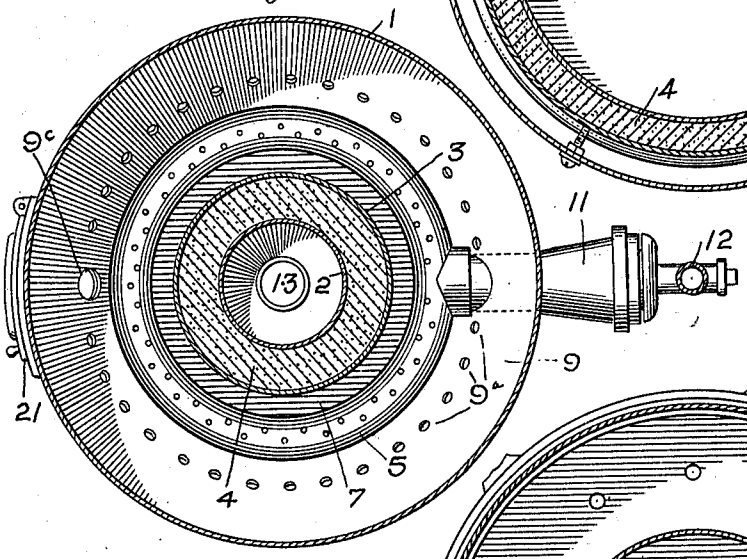
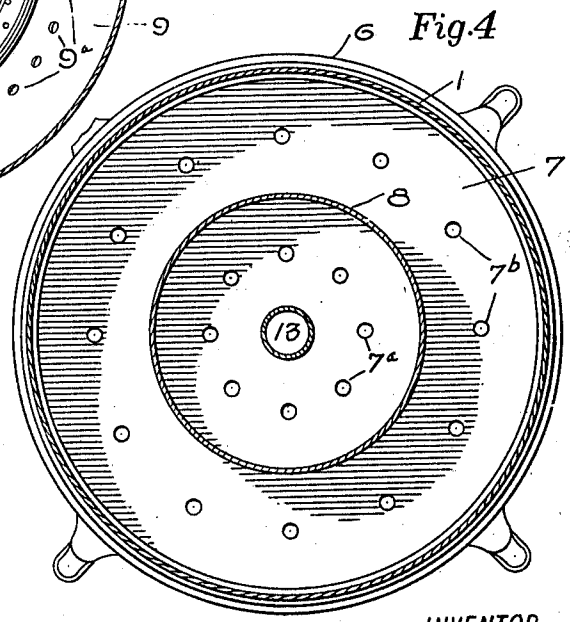


Fig. 4



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UNITED STATES PATENT OFFICE.

JOSEPH RUBADO, OF CHICAGO, ILLINOIS.

GAS-HEATER.

982,879. Specification of Letters Patent. Patented Jan. 31, 1911.

Application filed December 24, 1909. Serial No. 534,866.

To all whom it may concern:

Be it known that I, JOSEPH RUBADO, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented new and useful Improvements in Gas-Heaters, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The purpose of this invention is to provide an improved construction of a heater in which gas is employed as a fuel.

It consists in the features of construction shown and described as indicated in the claims.

In the drawings:—Figure 1 is a vertical axial section of a heater embodying this invention. Fig. 2 is a section at the line 2—2 on Fig. 1. Fig. 3 is a section at the line 3—3 on Fig. 1. Fig. 4 is a section at the line 4—4 on Fig. 1.

The essential elements of the structure shown in the drawings are, first, an exterior heat radiating shell, which is preferably a vertical cylinder, 1; second, an interior insulating shell positioned coaxially with the shell, 1, comprising inner and outer walls, 2 and 3, inclosing the annular cavity occupied by the insulating material, 4, and third, a gas burner, 5, positioned so that the flames issuing from it and the products of combustion pass up between the outer heat-radiating shell and the inner insulating shell for final discharge to the flue. The shell, 1, is mounted upon a suitable base, 6, which has an apertured bottom, 7, and an annular partition, 8, coaxial with the shell and resting on the bottom, 7, between an inner circular series of air apertures, 7^a, and an outer series of such apertures, 7^b. From the upper end of the partition, 8, an inverted frusto-conical partition, 9, extends to the inner surface of the outer shell, 1. This frusto-conical partition has draft apertures, 9^a. The burner, 5, which is in the form of an annular perforated pipe having connected to it at one side an inleading fixture, 11, which is a mixer of ordinary form, is lodged upon the upper side of the inverted frusto-conical partition, 9, which tends to center it about the axis of the inner and outer shells.

12 represents the gas supply pipe which enters the mixer at the center as usual. The inner insulating shell is centered within the outer shell, 1, partly by means of a tubular stem, 13, at the lower end which passes through the hollow boss, 7^c, at the center of the bottom, 7, and partly by adjusting screws, 14, any convenient number of which may be employed at different points in the length and circumference of the structure, being set in and protruding inwardly from the outer shell, 1, and impinging against the outer surface of the inner shell. The said inner shell is further supported by angle irons, 15, at its upper end secured to the outer shell. The outer wall, 3, of the inner insulating shell has a plurality of circumferential corrugations or protruding circumferentially-extending ribs, 16, which, by protruding thus outwardly from the inner shell toward the inner surface of the outer shell operate to narrow or throttle the passage for the products of combustion at a plurality of points in the height of the structure. Preferably, the annular passage for the products of combustion is thus narrowed progressively from the lower end upward, the upper rib, 16, protruding nearer to the inner surface of the outer shell, 1, than the lowest rib, the intermediate ribs being protruded to an intermediate degree, the purpose being to proportion the passage or throat-way past the successive ribs approximately according to the volume of the gases which is reduced by cooling as the gases advance upwardly through the heater; and the purpose of all the ribs is to detain the gases in proximity to the heat-radiating shell long enough to cause their heat to be imparted as largely as possible to said shell, and so rendered available for radiation in the space to be heated. Any suitable or convenient material of low capacity for conducting heat may be employed to fill the cavity of the inner insulating shell. Plaster of paris or a mixture of the same with asbestos I have found to serve the purpose with good effect.

The lower end of the insulating member or shell is tapered substantially parallel to the slope of the frusto-conical partition, 9, and the hollow stem, 13, is secured to it at the apex of its tapered portion for admitting air from below the heater; that is, from near the floor of the apartment, into the interior cavity of the insulating shell. This shell is closed at the top by a diaphragm, 17, which has a central aperture, 17^a, from which the air passes out of the central cavity

of the insulating shell into a frusto-conical hood, 19, which terminates the outer shell, 1, at the upper end and leads from its apex by way of a pipe, 19^a, to the chimney, not shown. The air that enters through the stem, 13, and passes out at the top of the insulating shell into the hood is thus mingled with the products of combustion escaping at the upper end of the annular space between the outer radiating shell and the inner insulating shell.

The frusto-conical partition, 9, may be reinforced by duplication, a similarly perforated diaphragm, 9^x, being positioned below it to adapt it better to carry the burner and avoid buckling from the heat of the burner, which may sometimes be sufficient to tend to cause such diaphragm to buckle if not reinforced. The outer shell, 1, may be provided with a view port, 20, for which any convenient form of closure, as the door, 21, may be provided, and the frusto-conical diaphragms, 9 and 9^x, are apertured at 9^e, so that the action of the burner may be observed through said view port.

It will be understood that not only is the cold air drawn from the floor of the apartment to supply the combustion, entering for that purpose through both series of apertures, 7^a and 7^e, at the bottom, but also that the draft produced by the connection of the interior cavity of the insulating shell with the discharge pipe, 19^a, further operates to draw air from the floor through the tubular stem, 13, at the lower end of said interior insulating shell, and that by thus drawing the colder air from the floor, the warmer air is drawn down to the floor, with a tendency to equalize the temperature in the apartment more perfectly than if there were not this provision for producing an upward draft through the device from the very bottom.

I claim:—

1. A gas heater comprising an outer heat-radiating shell and an inner insulating shell positioned to form a thin annular passage between the two shells; a burner positioned relatively to the lower end of said annular passage for discharge of the products of combustion into said passage, a final discharge for the products of combustion connected with the upper end of said passage, and means separate and independent from the source of air supply to the burner for admitting air into the inner cavity of the inner shell, said cavity having communication at its upper end with said final discharge.

2. A gas heater comprising, in combination with an exterior heat-radiating shell, an interior insulating shell positioned with respect to the outer shell to form between them a thin annular passage from end to end; a hood at the upper end of the outer shell into which said passage opens at the top; a final discharge connection from said hood; a bottom for the exterior shell and a bottom for the interior insulating shell forming between said bottoms a chamber which communicates with the lower end of said annular passage, and a burner located in said chamber, the interior cavity of the insulating shell having communication at the lower end with the exterior air and at the upper end with the final discharge.

3. A gas heater comprising, in combination with an upstanding exterior heat-radiating shell, an interior insulating shell positioned with respect to the exterior shell to form between them a thin annular passage from top to bottom; said insulating shell having a tapered or inverted conical bottom; an annular burner positioned around the said tapered lower end, a hood which closes the upper end of the outer shell and into which the annular passage discharges at the upper end, the outer shell having a bottom plate and an annular partition in said outer shell below the burner extending upwardly from the bottom and flaring to the outer side wall of said shell, said bottom plate being apertured inside and outside of said annular partition to afford limited air supply to the burner, the flaring portion of said partition being apertured to admit said air supply above the burner.

4. A gas heater comprising, in combination with an outer heat-radiating shell, a gas burner positioned in the lower part of such shell; an inner insulating shell which has a bottom overhanging the burner, and which is positioned with respect to the outer shell to form between them a thin annular passage whose lower end is positioned to receive the products of combustion from the burner, one of the walls of said passage having a plurality of circumferentially-extending ribs which protrude into the passage for narrowing the same for throttling the said products of combustion in the passage upward, said ribs being graduated to diminish the passage progressively from below upward.

5. A gas heater comprising an outer heat-radiating shell, a gas burner positioned at the lower part of said shell; an interior insulating shell having its lower end conical and overhanging the burner, said interior shell being positioned with respect to the outer shell to form between them a thin annular passage whose lower end is positioned to receive the products of combustion from the burner and comprising an inner and outer wall and insulating material occupying the interspace between them, the central chamber encompassed by said inner wall having air communication at the lower end through said bottom of said insulating shell; a hood at the top of the outer shell which overhangs the annular passage between the

shells, said central chamber of the inner shell having communication at its upper end with said hood.

6. A gas heater comprising, in combination with an outer upright shell having a bottom plate, an annular partition therein extending upwardly from the bottom and flaring to the side wall of the shell; an annular burner lodged above the flaring portion of said partition; an interior insulating shell positioned with respect to the outer shell to form between the two a thin annular passage, the lower end of said interior shell being tapered overhanging the flaring partition, the bottom of the outer shell being apertured to afford limited air supply to the burner inside and outside of said partition, said partition being apertured at its flaring portion above the burner, the cavity of the inner shell having outer air communication at the lower end separated from the burner air supply and having at the top an opening for communication with the final discharge.

In testimony whereof, I have hereunto set my hand at Chicago, Illinois, this 14 day of December, A. D. 1909.

JOSEPH RUBADO.

Witnesses:
ROBERT C. DANBY,
JOSEPH GROSVENAUD.