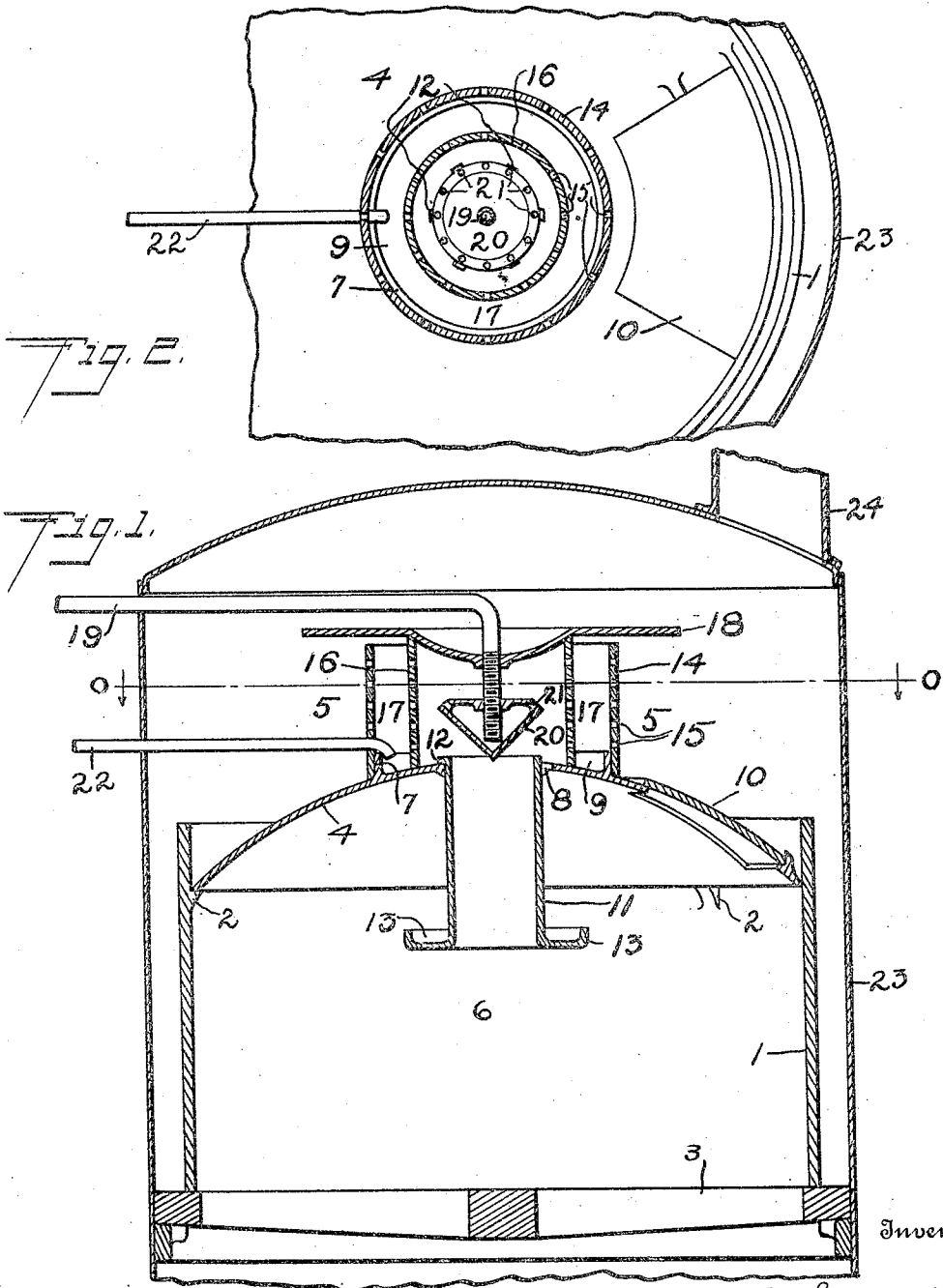


J. S. LINDQUIST.
HEATER.
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1,056,807.

Patented Mar. 25, 1913.



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HEATER.

1,056,807.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN S. LINDQUIST, a citizen of the United States, of the city of Lincoln, county of Lancaster, and State of Nebraska, have invented certain new and useful Improvements in Heaters, and have described the same in the following specification, illustrated by the accompanying drawings.

10 My invention relates to that class of heaters which are applicable to stoves, boilers, furnaces and the like, have two or more separate burners, and are adapted to use liquid fuel, or both solid and liquid fuels simultaneously, and to consume their own smoke.

It is the object of the invention to simplify and improve the construction, to make sure the normal operation, to intensify the heat, and in general to increase the efficiency, of heaters of this class. To accomplish this object, I incorporate in my improved heater two combustion chambers, one above the other, a transverse diaphragm, or deck, between these chambers, a vertical pipe connecting the chambers through a hole in the deck, and a liquid-fuel burner of special construction in each chamber.

The drawings show the best manner in which I have contemplated applying the principles of the invention.

Figure 1 is a vertical axial section of a heater of the specified class, constructed in accordance with these principles and located co-axially in a cylindrical hot-air furnace. Fig. 2 is a partial horizontal section on the line O—O of Fig. 1.

This illustrative heater, which is made wholly of castiron, comprises the hollow cylindrical firebox 1, having near the top a plurality of inwardly projecting ribs 2, and having at the bottom the grate 3 on which coal may be burned. The otherwise open top of this firebox is occupied by the deck 4, which is a concavo-convex annular baffle-plate, diaphragm or cover, supported by the ribs 2 in a general horizontal position between the upper and the lower combustion chambers 5 and 6. This dome-shaped deck has an annular flange 7, co-axially encircling the central deck-opening, or hole, 8, and upstanding uniformly to somewhat higher level than the inner and upper circular margin of that apical perforation. This flange forms the outer wall, while the inner margin of the deck forms the bottom

and inner wall, of the intermediate horizontal annular channel, liquid-fuel receptacle and burner 9. The deck has also a sliding door 10, whereby coal may be introduced to the grate 3. In the middle of the firebox, and loosely fitted into the hole 8, the vertical heat-pipe 11, having at the top a number of radially projecting teeth 12, is suspended thereby from the deck 4. This pipe has at the bottom the encircling and upturned flange 13, forming with the annular horizontal fuel receptacle and burner denoted by the same numeral 13. This is located directly under the fuel receptacle and burner 9 and in a position to receive through the hole 8 the overflow therefrom.

Standing on the convex top of the deck 4, and contiguously encircling the flange 7, is the outer burner cylinder 14, perforated with numerous small holes 15 for the passage of gases; while the inner burner cylinder, 16, similar to cylinder 14; and similarly perforated, but smaller and a little taller, and separated therefrom by the annular chamber 17, stands upright in the fuel receptacle 9. Across the top of the burner cylinder 16 and over the top of the burner cylinder 14, rests the circular baffle-plate 18, in the top of the upper combustion chamber 5. Down through the middle of this plate is inserted the supply pipe of air or steam, 19, having a flaring nozzle 20, whose numerous discharge orifices 21 are directed angularly upward and outward toward the encircling burner cylinders 14 and 16. The supply pipe 22, which enters the chamber 17 through a hole in the cylinder 14, discharges liquid fuel into the annular burner 9; while the chimney pipe 24 ultimately carries the gaseous products of the combustion out from within the furnace or furnace casing 23.

In the operation of the invention, the lower burner 13 is supplied with liquid fuel by overflow from the upper burner 9 through the hole 8 and outside the pipe 11, the quantity of the supply being regulated from time to time by the regulation of the supply from the pipe 22. Air, gases, smoke and in general all the products of combustion occurring in the firebox, ascend continuously in a heated state through the pipe 11 into the interior of the inner burner cylinder 16, where the volume of the mingled mixture is increased by the continuous ad-

dition of air or steam, as may be desired, from the pipe 19 and nozzle 20. The augmented mixture seeks to escape from the inner cylinder 16 through the holes 15. At the same time liquid fuel supplied to the burner 9 and heated therein from the fire-box below, is rapidly volatilized in the chamber 17. There it commingles with the mixture just mentioned, already hot, entering that chamber in jets through the holes 15 of cylinder 16. In that chamber, as well as at all the holes 15 and in the space between the cylinder 14 and the baffle-plate 18, the entire resulting mixture and the unmingled vapor, if any, from the fuel in the burner 9, burn furiously and completely, producing intense heat without smoke.

I claim as my invention—

1. A heater of the specified class, comprising two combustion chambers, one above the other, an annular deck, common to both chambers and forming between them a partition having a hole of intercommunication from chamber to chamber, an upstanding flange formed integrally on the top of the deck and forming with the inner margin of the deck an annular burner encircling the hole, an open pipe dependent from the margin of the hole, and an annular burner integrally formed around the end of the pipe in the lower chamber.

2. A heater of the specified class, comprising two combustion chambers, one over the other, a transverse deck, common to both chambers and forming between them a partition having an intercommunicating hole, an upstanding flange forming part of the deck and forming with the inner margin of the deck an annular burner encircling the hole, an open vertical pipe connecting the chambers through the hole and having peripheral teeth to engage the margin of the hole, and a burner formed upon the free end of the pipe in the lower chamber.

3. A heater of the specified class, comprising two combustion chambers, one over the other, a deck, common to both chambers and forming between them a partition having an intercommunicating hole, an upstanding annular flange forming part of the deck and forming with the inner margin of the deck an annular burner encircling the hole,

a vertical heat pipe dependent from the margin of the hole, a burner formed on the free end of the pipe in the lower chamber, a perforated cylindrical wall standing in the annular burner, and a baffle-plate upon the perforated wall.

4. A heater of the specified class, comprising two combustion chambers, one over the other, a deck, common to both chambers and forming between them a partition having a central hole, a flange formed on the top of the deck and forming with the inner margin of the deck an annular burner encircling the hole, a vertical pipe, open from end to end and dependent from the margin of the hole, a burner formed around the pipe in the lower chamber, two perforated cylindrical walls, coaxial with the hole, standing one within the other upon the deck, and a baffle-plate upon the inner perforated wall.

5. A heater of the specified class, comprising two combustion chambers, one over the other, a transverse deck, common to both chambers and forming between the chambers a partition having a central hole, an annular channel formed in the top of the deck and encircling the hole, an open cylindrical pipe, dependent from the margin of the hole, two perforated cylindrical walls, coaxial with the hole, standing one within the other on the deck, and a baffle-plate at the top of the walls.

6. A heater of the specified class, comprising two combustion chambers, one over the other, an annular concavo-convex deck, common to both chambers and forming between them a partition having a central apical hole, an upstanding annular flange formed on the deck and forming with the inner margin of the deck an annular burner encircling the hole, a vertical pipe, open from end to end, and dependent from the margin of the hole into the lower chamber, and an annular channel-shaped burner formed around the lower end of the pipe.

In testimony whereof I hereto subscribe my name in the presence of two witnesses.

JOHN S. LINDQUIST.

Witnesses:

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JOHN ASPLUND.