

S. BOAL.
HEATER.

(Application filed Sept. 14, 1899.)

(No Model.)

2 Sheets—Sheet 1.

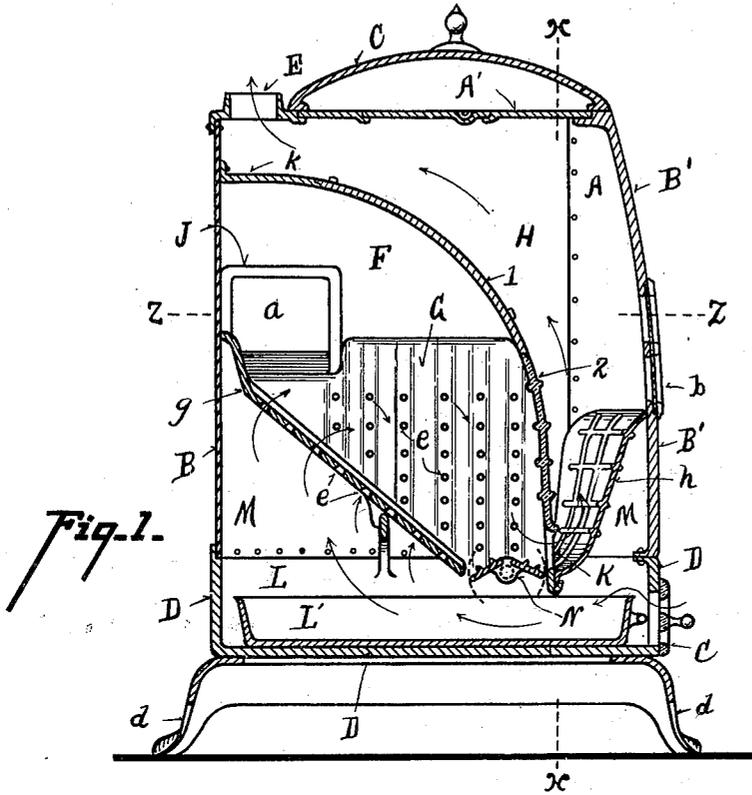


Fig. 1.

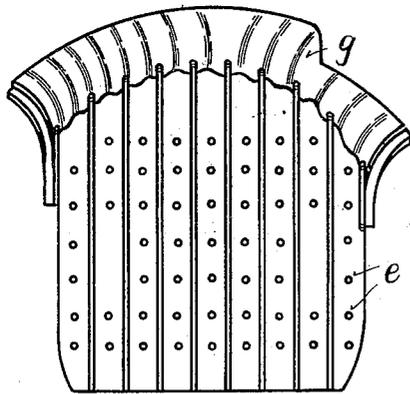


Fig. 2.

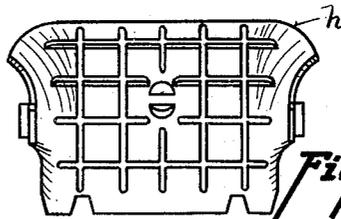


Fig. 3.

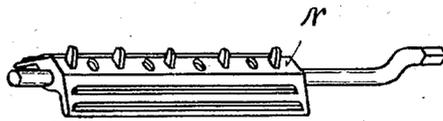


Fig. 4.

Witnesses
C. W. Miles.
Oliver B. Kaiser.

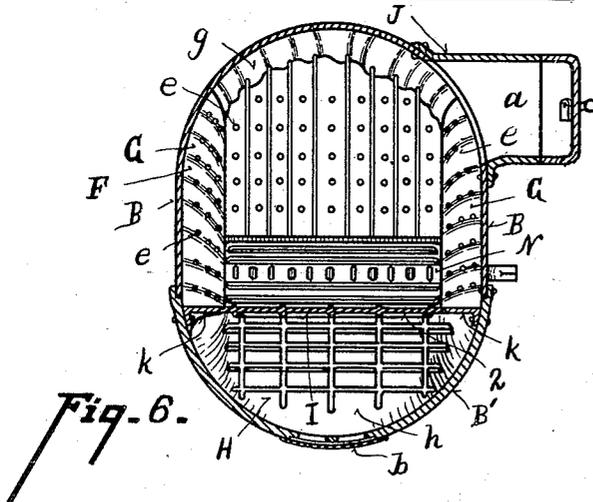
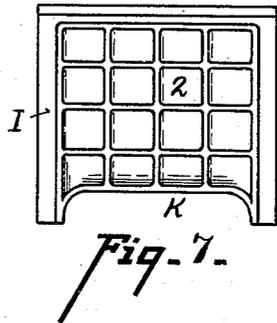
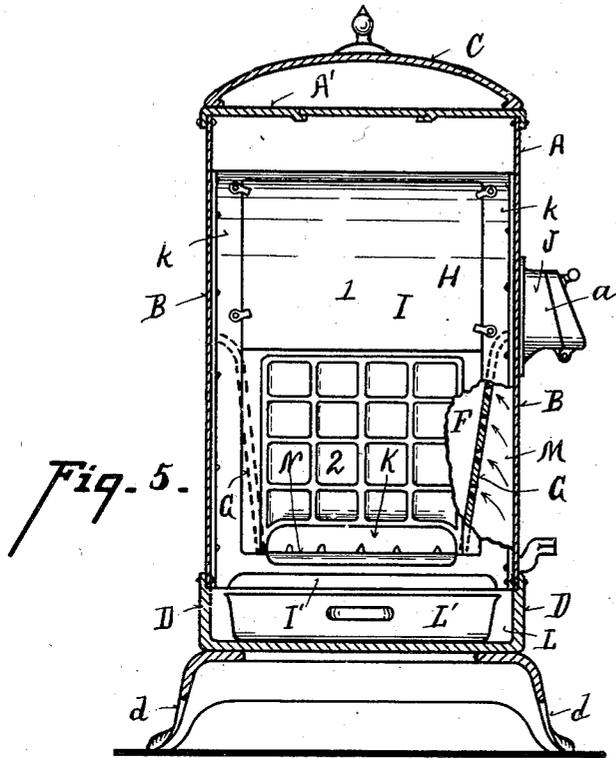
Inventor
Stanhope Boal
 By *Wm. B. B. & Wm. B.*
 Attorneys

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2 Sheets—Sheet 2.



Witnesses
C. W. Miles
Oscar B. Kaiser

Inventor
Stanhope Boal
 By *Wm. Boyd & Wm. ...*
 Attorney

UNITED STATES PATENT OFFICE.

STANHOPE BOAL, OF PIQUA, OHIO.

HEATER.

SPECIFICATION forming part of Letters Patent No. 644,792, dated March 6, 1900.

Application filed September 14, 1899. Serial No. 730,412. (No model.)

To all whom it may concern:

Be it known that I, STANHOPE BOAL, residing at Piqua, in the county of Miami and State of Ohio, have invented certain new and useful Improvements in Heaters, of which the following is a specification.

My invention relates to an improvement in the combustion-chambers of stoves, furnaces, and heating apparatuses.

The exemplified type of my invention is shown as applied to a heating-stove.

One of the objects of my invention is to provide a construction which will give the greatest possible heating efficiency of the coal by reason of a more perfect combustion than has been heretofore obtained with stoves burning soft coal.

Another object of my invention is to provide a durable fire-box.

Another object of my invention is to produce a heater in which a steel shell can be employed.

These and other objects of my invention will be more fully set forth in the description of the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a central vertical sectional view of my improvement. Fig. 2 is an elevation of the back plate of the fire-box. Fig. 3 is an elevation of the front plate or fender. Fig. 4 is a perspective view of the revoluble grate-bar. Fig. 5 is a section on line *xx*, Fig. 1. Fig. 6 is a section on line *zz*, Fig. 1. Fig. 7 is an elevation of the arch-plate.

A represents a heating-stove provided with the ordinary rim and legs *d*, in which is seated the base D. To the inner periphery of the base is secured the shell B, which may be made of sheet metal, steel being preferred.

A' represents the top plate, which is shown made of cast-iron.

C represents the ornamental cover-plate.

B' represents the front plate of the stove. It is preferably made of cast-iron, because the flame and heat come in direct contact therewith. It may, however, be made of sheet metal and lined with any suitable material.

b represents the window or display-aperture, and *c* the door opening into the ash-pit L.

E represents the offtake-flue, and J the feed-door frame.

The interior of the heater is divided into two chambers—a primary and a secondary combustion-chamber. F represents the primary combustion-chamber, in which is enclosed the fire-box composed of the inclined perforated plate *g*, the perforated side plates G, and the imperforated front plate I, which in the preferred form of construction is of inclined curved form composed of the removable section 1, attached at the bottom to the section 2 and at the top to section *k*. When the section 1 is removed, the fire-box plates may be readily removed and inserted without taking the frame of the stove apart.

In the preferred form of construction the plates G *g* converge toward the bottom, making an air space or jacket around the fire-box. This jacket has the spaces M at the sides of the fire-box, as shown in Fig. 5, and the jacket-spaces M behind and under the inclined plates *g h*, as shown in Fig. 1. Thus the fire-box is surrounded by air within the shell of the heater, the air being supplied through the register of the door *c*, passing under the fire-box, entering the jacket-space from beneath. The air is heated by coming in contact with the plates of the fire-box, which are shown as corrugated or ribbed and provided with perforations *e*, so as to cause the air to enter in small streams into different portions of the fire-box. The fire-box plates when thus constructed and surrounded by the air-space can be made of cast-iron, which are very durable and not liable to warp or burn up. At the bottom of the fire-box a dumping-bar N is provided, so that the ashes and slag may be readily dumped into the ash-pan L'.

h represents a fender-plate, which is preferably of curved rib form.

K represents an opening in the front plate at the bottom of the fire-box, through which the gases generated in the primary combustion-chamber F pass into the secondary combustion-chamber H, which is of sufficient area to allow the complete combustion of the gases generated and aerated in the combustion-chamber.

E represents the uptake-flue, through which the products of combustion escape into the chimney-flue.

Mode of operation: Kindling is placed into the fire-box, which as soon as it becomes

thoroughly ignited heats the plates of the fire-box. Coal is then introduced through the feed-door *a* and is ignited at the bottom. The air entering through the orifices *e* is heated by coming in contact with the plates *h G g*. It permeates all through the fire-box and is thoroughly commingled with the gases generated therein. The mingled air and gases pass out through the opening *K*, playing against the fender-plate *h*, and pass upward into the secondary combustion-chamber *H*, which is of sufficient area to allow the complete expansion and combustion of the gases evolved from the primary combustion-chamber.

I have found by experience that with the construction above described the oxygen for supporting combustion is heated before it enters into the fire-box and thoroughly commingles and chemically unites with the gases generated in the primary combustion-chamber, producing almost perfect combustion in the secondary combustion-chamber, emitting but little smoke in the preliminary stages and with but a trace of smoke when the heater is in full blast.

It will be observed that the air-jacket completely surrounds the fire-box from top to bottom. This renders the fire-box comparatively indestructible and enables the use of a sheet-metal shell which, owing to its construction, does not require to be lined.

I regard as the primary feature of my invention the fire-box having perforated downwardly-inclined walls offset from the frame forming an air-jacket, the fire-box being provided with an opening at or near the base thereof for the egress of the commingled heated gases into the secondary combustion-chamber.

Having described my invention, I claim—

1. In a heater, the combination of a frame, a partition dividing the interior into a primary and overlying secondary combustion-chamber, a flue for said secondary chamber, a fire-box in the bottom of the primary chamber consisting of perforated plates supported at the top against the frame and inwardly inclined to a bottom support, a fire-box bottom, a passage between the fire-box and secondary combustion-chamber through the bottom of the partition, and a non-perforated front plate supported at the top by the frame in the secondary combustion-chamber and inclined to the said bottom, the inclination of the bottom plates forming an air-jacket encompassing the fire-box, substantially as described.

2. In a heater, the combination of a frame, an upwardly and rearwardly curved plate dividing the interior into a primary and an overlying combustion-chamber, a feed-door

for the former, an offtake-flue for the latter, a fire-box in the bottom of the combustion-chamber composed of perforated plates supported at the top by the frame and inclined rearwardly to a bottom support, a bottom for the fire-box, an orifice between the fire-box and secondary combustion-chamber through the lower portion of the partition, an imperforated front plate inclined from the front of the frame to the fire-box bottom, the space formed by the inclined plates forming an encompassing air-jacket, whereby air is drawn downwardly through the fuel from all sides except the side upon which the products of combustion are carried out, substantially as described.

3. In a heater, the combination of a steel frame, an upwardly and rearwardly curved cast-iron partition-plate, having a passage formed in the lower end and supported by said frame, a primary and overlying secondary combustion-chamber being formed by said partition, a door for the former and offtake-flue for the latter, a fire-box in the primary chamber composed of detachable perforated plates resting at their tops against the frame and inwardly inclined, a fire-box bottom, a non-perforated detachable fender-plate in the secondary combustion-chamber likewise supported at the top against the frame and inwardly inclined to the bottom, the space formed between the frame and inclined detachable plates forming a superheating air-jacket, substantially as specified.

4. In a heater the combination of a primary and a secondary combustion-chamber separated by an upwardly and rearwardly turned partition, a passage-way in the lower end thereof, inclined perforated plates in the primary chamber, an imperforated inclined plate in the secondary chamber, and a fire-box bottom abutting said inclined plates at their lower ends, substantially as described.

5. In a heater, the combination of a primary and a secondary combustion-chamber separated from each other by a curved partition-plate, an orifice in the lower end thereof, inclined perforated plates in the primary chamber, an imperforated plate in the secondary chamber, the said plates resting at their upper ends against the heater-frame, thereby forming an air-jacket between the plates and frame, a fire-box bottom abutting the lower end of said plates, a feed-door for the primary chamber and offtake-flue for the secondary chamber, substantially as described.

I testify whereof I have hereunto set my hand.

STANHOPE BOAL.

Witnesses:

SETH MCCULLOCH,
BLANCHE RUSSELL.