

No. 698,607.

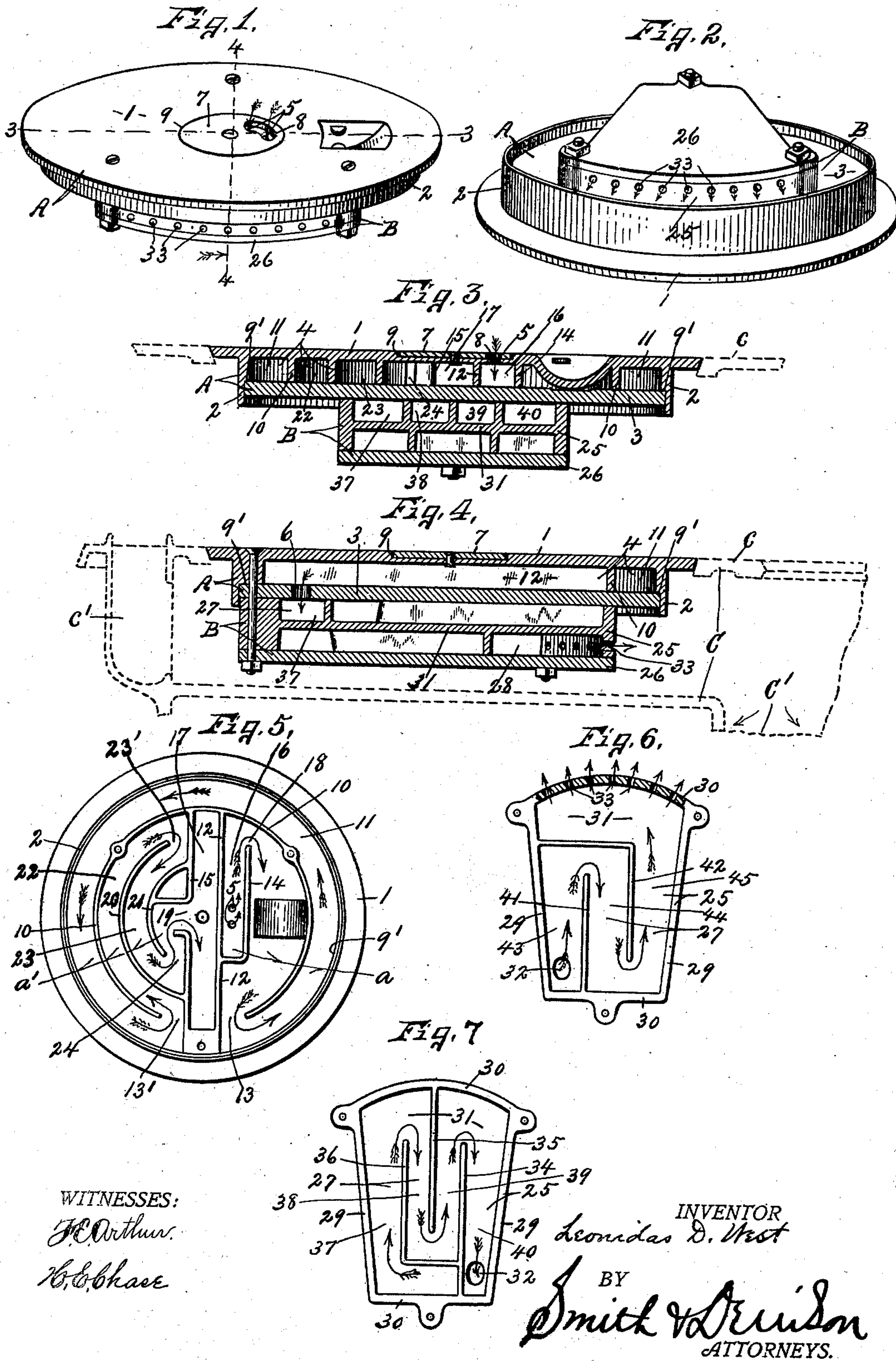
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L. D. WEST.

APPARATUS FOR PRODUCING COMBUSTION.

(Application filed Feb. 9, 1901.)

(No Model.)





# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR PRODUCING COMBUSTION.

SPECIFICATION forming part of Letters Patent No. 698,607, dated April 29, 1902.

Application filed February 9, 1901. Serial No. 46,708. (No model.)

*To all whom it may concern:*

Be it known that I, LEONIDAS DOTY WEST, of Geneva, in the county of Ontario, in the State of New York, have invented new and useful Improvements in Apparatus for Producing Combustion, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to improvements in apparatus for producing combustion, and particularly to a means for supplying heated air to the combustion-chamber of a heater.

The object of this invention is to produce a simple and compact device heated by the escaping products of combustion for supplying a continuous current of fresh air to the fuel, whereby the gases of the fuel are consumed within the combustion-chamber, the fuel is materially economized, and the heat is localized or concentrated, thereby greatly increasing the efficiency of the heater for any purpose.

The further object of this invention is to produce a new article of manufacture for the purpose above mentioned which may be readily applied to any form of heater without in any way altering said heater or adding materially to its expense.

To this end the invention consists in the construction, combination, and arrangement of an air feeding and heating device, as hereinafter fully described, and pointed out in the claims.

Referring to the drawings, Figures 1 and 2 are perspective views of my invention, showing, respectively, its opposite outer and inner faces. Figs. 3 and 4 are sectional views taken, respectively, on lines 3-3 and 4-4, Fig. 1, the adjacent portions of a stove or range being shown in Fig. 4. Fig. 5 is an inverted plan view of the griddle-section of the upper air-chamber of the device seen in former figures omitting the lower plate. Figs. 6 and 7 are opposite face views of the central plate of the lower air-chamber.

Similar reference characters indicate corresponding parts in all the views.

This invention consists, essentially, of one or more air-receiving shells A and B, adapted to form a portion of one of the inclosing walls, as the upper wall *c* of a heater C, a por-

tion of which is seen in Fig. 4, said shells being preferably extended into the path of the escaping products of combustion between the combustion-chamber, as *C'*, and the smoke-flue, as *c'*.

The shell A preferably consists of a griddle-section 1, having a depending annular flange 2 and a removable lower plate 3, all of which parts are combined to form an air-receiving chamber 4, the upper face of the griddle-section being substantially flat and disposed in a plane coincident with the upper face of the wall *c* of the heater, and the flange 2 and plate 3 are disposed in a plane beneath said wall *c* in the path of the products of combustion passing from the combustion-chamber *C'* to the smoke-flue *c'*. The shell A is provided with suitable inlet and outlet openings 5 and 6, which are preferably formed, respectively, in the upper wall of the griddle-section 1 and the lower plate 3, the inlet-opening 5 communicating with the atmosphere and serving to admit air to the chamber 4 and the outlet-opening 6 serving to discharge the heated air from said chamber 4 into the shell B or directly into the fire-box of the heater, as may be desired.

A movable closure 7 is usually pivotally secured to the griddle-section 1 and is provided with an opening 8, movable into and out of registration with the apertures 5, for controlling the inlet of air to the chamber 4. The griddle-section 1 is generally provided with a recess 9 in its upper face, and the closure 7 is mounted in said recess, its upper face being disposed in a plane substantially coincident with the upper face of the griddle-section. The annular flange 2 preferably incloses the lower plate 3 and is formed with a suitable stop-shoulder, as an inner annular face 9', for limiting the inward movement of said lower plate and holding the same in separated relation to the griddle-section 1. The griddle-section 1 is provided with an inner depending circular rib 10, preferably concentric with the annular flange 2, for forming a concentric air channel or conduit 11, and with a transverse rib or partition 12, connecting one side of the rib 10 with the opposite side of the annular flange 2 for dividing the space inclosed by the concentric rib 10 into air-compartments *a* and *a'* and for break-



ing the continuity of the channel or conduit 11, said concentric rib 10 being cut away at opposite sides of the end of the transverse rib 12, adjacent to the annular flange 2, for forming air-passages 13 and 13', connecting the compartments  $a$   $a'$  with the opposite ends of the concentric channel or conduit 11. The transverse rib 12 separates the inlet-openings from the outlet-openings, the inlet-openings leading to the compartment  $a$  and the outlet-openings leading from the compartment  $a'$ .

Additional transverse ribs 14 and 15 are formed upon the lower faces of the griddle-section 1 substantially parallel with and at opposite sides of the rib 12 for forming transverse channels or conduits 16 and 17, the channel 16 receiving the air from the inlet-openings 5 and the channel 17 discharging through the outlet-openings 6.

The ribs 12 and 14 inclose the inner ends of the inlet-openings 5, the rib 14 being united at one end to the rib 12 and having its other end extended toward the intermediate portion of the concentric rib 10 and cut away inside of said concentric rib for forming an air-passage 18, connecting inlet-openings 5 and channel 16 with the compartment  $a$ . The rib 15 is united in substantially the same manner as the rib 12 to the annular flange 2, and concentric rib 10 is cut away at its intermediate portion for forming an air-passage 19, connecting the channel 17 with the compartment  $a'$ , and, together with the rib 12, incloses the inner end of the discharge-opening 6.

The compartment  $a'$  is preferably provided with a plurality of separated ribs 20 and 21, usually formed integral with the griddle-plate 1 and arranged substantially concentric with the flange 2 for forming additional concentric air channels or conduits 22 and 23, the rib 20 being united to the rib 15 at one side of the passage 19 nearest the passage 13' and its other end extended beyond the passage 19 and cut away for forming an additional air-passage 23'. The other rib 21 is united to the rib 15 at the opposite side of the passage 19 and is cut away for forming an air-passage 24, all of said ribs having their inner edges lying in substantially the same plane as the annular bearing-face of the flange 2 and are engaged by the lower plate 3 for preventing the escape of the heated air except through the channels and passages just described.

It is evident from the foregoing description, taken in connection with Fig. 5 of the drawings, that the air passes from the inlet-openings 5 into the channel 16, through the passage 18 to the compartment  $a$ , and thence through the passage 13 into the concentric channels 11, 22, and 23, and thence through the passages 24 and 19 to the central elongated channel 17, and discharges through the outlet-opening 6 into another air-chamber or directly into the combustion-chamber, if desired.

The above-described arrangement of air

channels and passages form a tortuous conduit for the air from the inlet to the outlet openings of the shell A and serve to heat the air to a high degree of temperature before the latter enters the combustion-chamber, it being understood that the inequality of air-pressure without and within the combustion-chamber, respectively, causes the air to feed automatically through the conduits and passages just described.

The shell B, previously mentioned, is usually supported by the griddle-section 1 beneath the lower plate 3 and preferably consists of intermediate and outer plates 25 and 26, arranged substantially parallel with each other, the intermediate plate 25 having recesses in its opposite faces for forming suitable air-chambers 27 and 28, and inclosing side and end walls or flanges 29 and 30, and a substantially central diaphragm 31 separating the chambers 27 and 28 from each other, except that said chambers are connected by a restricted air-passage 32, formed in the diaphragm 31. The side walls 29 of each of the chambers 27 and 28 are preferably arranged to diverge from one end of the shell B, and the air-passage 32 usually extends through the diaphragm 31 in proximity to the smaller end of the shell for connecting the smaller ends of said chambers 27 and 28. The longer end walls 30 of the chambers 27 and 28 are preferably curved outwardly, one of which, as the longer end wall of the lower chamber, is provided with a series of restricted apertures 33 for discharging the heated air directly into the combustion-chamber.

The plate 3, previously described, forms the lower wall of the shell A, and the discharge-opening 6 of said plate becomes the inlet-opening of the upper air-chamber 27 of the shell B, which is so relatively arranged to the shell A that the opening 6 communicates with the smaller end of the upper air-chamber 27.

In order that the air may be heated to a high degree of temperature in the shell B, I provide the chamber 27 with a series of lengthwise partitions 34, 35, and 36, arranged substantially parallel with each other and, together with the outer inclosing walls of said chamber, form a series of air-channels 37, 38, 39, and 40, the channel 37 receiving the air from the inlet-opening 6 and the channel 40 serving to discharge the air through the passage 32 to the lower air-chamber 28, said channels leading successively from one to the other and forming a tortuous path for the air from the opening 6 to the passage 32. The chamber 28 is also provided with a series of partitions 41 and 42, arranged in staggered relation with each other and, together with the side walls of said chamber, form a series of channels 43, 44, and 45, the channel 43 receiving the air from the passage 32, and the apertures 33 lead from the channel 45 and discharge into the combustion-chamber of the heater.



In the operation of my invention the fresh air is admitted through the inlet-opening 5 of the griddle-plate 1, the quantity being regulated by the closure 7 is caused to pass in 5 tortuous paths through the air-chamber of the shell A through a restricted passage 6 to the upper chamber 27 of the shell B, where it again passes through tortuous channels through the restricted passage 32 into the 10 tortuous channels of the chamber B and is discharged into the combustion-chamber through the several restricted passages 33, which are arranged in an arc of a circle and serve to distribute the air to the air-combus- 15 tion chamber in radiating jets.

The operation of my invention will now be readily understood upon reference to the foregoing description and the accompanying drawings, and although I have shown the 20 shells A and B as connected to each other it is evident that either of the same may be used independently of the other in connection with any form of heater and supported in any desired position relative to the combustion- 25 chamber.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In combination with a combustion-cham- 30 ber, an air-heating device having an air-heating chamber provided with inlet and discharge openings and with concentric ribs for

forming an air-channel, a second rib extending across the channel, said inlet and outlet openings communicating with the channel at 35 opposite sides of the second rib.

2. In combination with a combustion-chamber, an air-heating chamber having an annular inclosing wall and separated upper and lower walls formed respectively with inlet 40 and outlet openings, a concentric partition or rib within the annular wall and provided with an opening in one side, and a transverse rib dividing the space within the concentric partition, the spaces at opposite sides of the 45 rib being connected respectively to the inlet and outlet openings for causing the air to travel around the concentric rib from the inlet to the outlet openings.

3. An air-heating device comprising a shell 50 having a central plate and air-heating chambers at opposite sides of the plate and communicating with each other, said shell having an inlet-opening in one end leading to one of the chambers and an outlet-opening 55 extending through the opposite end wall of the other chamber for the purpose described.

In witness whereof I have hereunto set my hand this 31st day of January, 1901.

LEONIDAS DOTY WEST.

Witnesses:

C. K. MINOR,  
GEORGE E. BURGESS.