W. L. BOXALL.

WOOD GAS GENERATOR AND BURNER.

APPLICATION FILED AUG. 10, 1909.

1,111,129.

Patented Sept. 22, 1914.

Fig. 1.

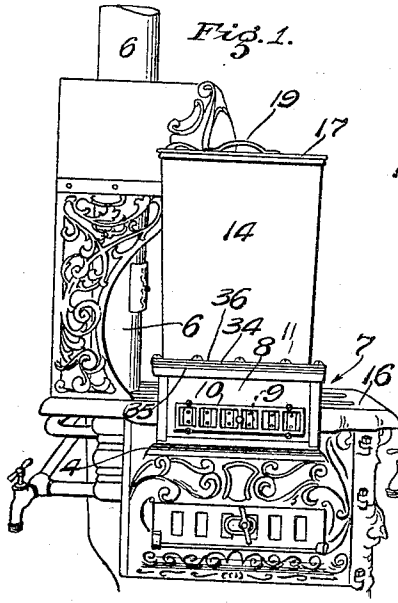


Fig. 2.

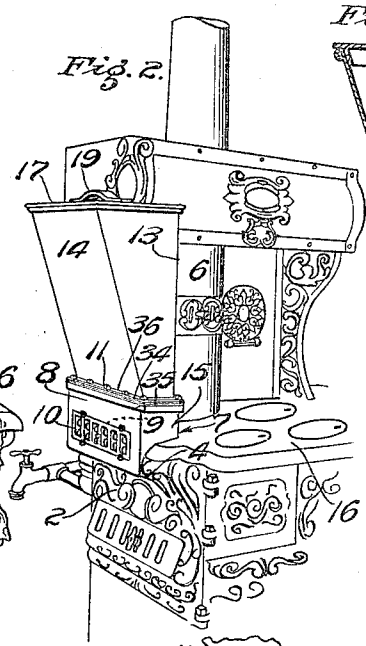


Fig. 3.

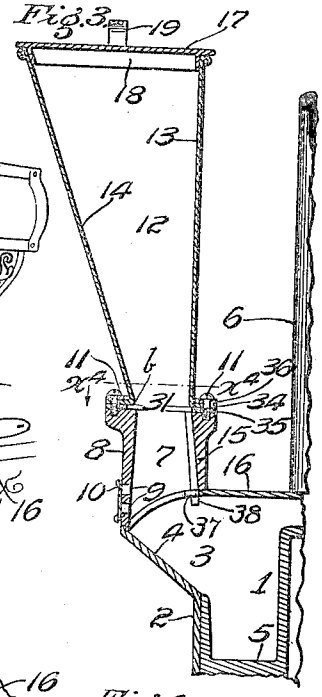


Fig. 5.

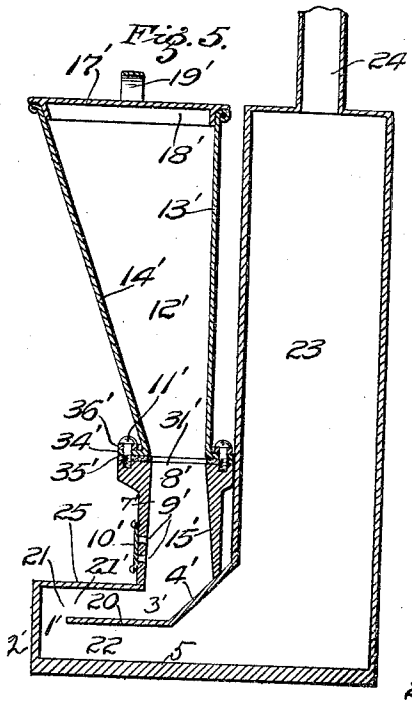


Fig. 7.

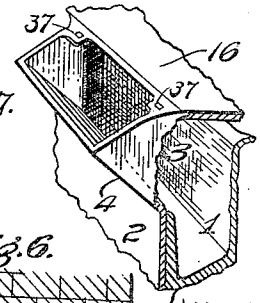


Fig. 4.

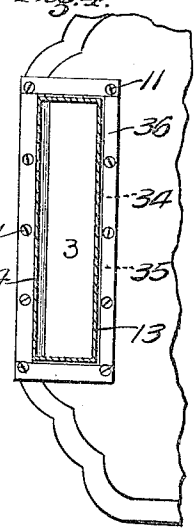
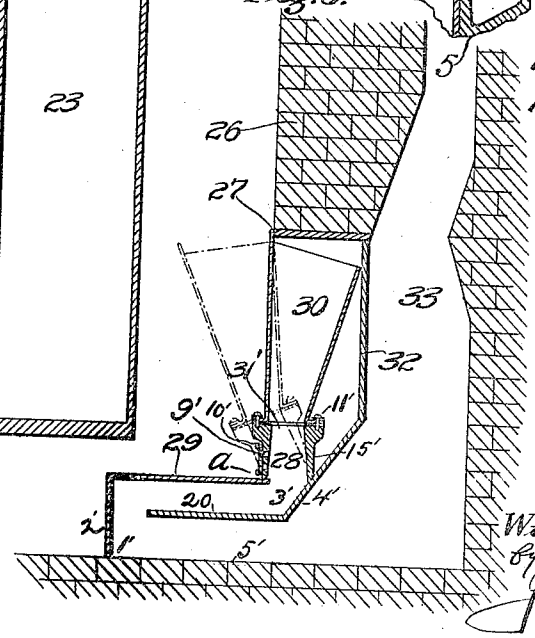


Fig. 6.



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UNITED STATES PATENT OFFICE.

WILLIAM L. BOXALL, OF PERRY, CALIFORNIA.

WOOD-GAS GENERATOR AND BURNER.

1,111,129. Specification of Letters Patent. Patented Sept. 22, 1914.

Application filed August 10, 1909. Serial No. 512,254.

To all whom it may concern:

Be it known that I, WILLIAM L. BOXALL, a citizen of the United States, residing at Perry, in the county of Los Angeles and State of California, have invented a new and useful Wood-Gas Generator and Burner, of which the following is a specification.

This invention is designed for the economical production of heat from wood and like materials and it is designed to use such materials in a comminuted form as for instance in the form of sawdust and shavings, to produce gas and to at once burn such gas. Difficulties to be overcome in the process of burning such fuels are, liability of clogging, liability of too rapid feeding, liability of uneven combustion and liability of smothering the fire when new material is supplied thereto.

This invention is designed to overcome all of said difficulties in a simple manner and to provide cheap and convenient means which may be applied to an ordinary stove or range to transform the same into a wood-gas producer and burner. The invention is also applicable to box stoves, fireplaces and chimney-pieces.

The accompanying drawings illustrate the invention in some of the forms in which I contemplate embodying the same.

Figure 1 is a front elevation of a stove or range provided with my invention. Fig. 2 is a view of the same from the right of Fig. 1. Fig. 3 is a fragmental vertical sectional elevation of the form shown in Figs. 1 and 2. Fig. 4 is a plan in section from line x^4, Fig. 3. Fig. 5 is a view analogous to Fig. 3 showing the invention as applied to a box stove. Fig. 6 is a vertical fragmental mid-section detail showing the invention as applied in a chimney-piece. Fig. 7 is an enlarged fragmental detail of the connection between the throat and the range or stove shown in Figs. 1, 2 and 3.

The combustion chamber 1 as in Figs. 1 to 4 and Fig. 7 is provided at the top of its front wall 2 with an inlet 3 having a floor 4 that slants downwardly toward the chamber 1 and terminates above the bottom 5 of said chamber, said bottom of said chamber being closed against the admission of air except through said inlet 3 and the smoke-stack 6. Fitted to said inlet 3 is a vertical downwardly expanding throat 7 provided in its front wall 8 opposite the inlet 3 and above the level of the slanting floor 4, with a draft inlet 9 controlled by a damper 10. Fastened to the top of the throat 7 by screws 11 is a vertical hopper 12 that tapers downwardly to a cross-sectional area slightly wider than the top of the passage through the throat 7. The rear wall 13 of said hopper is vertical and the front wall 14 is aslant at an angle near the vertical so that the hopper tapers slightly downward to the top of the downwardly expanding throat. The rear wall 15 of said throat is of less length than the front wall 8 and said front wall extends down below the level of the bottom of the rear wall, and below the level of the top 16 of the combustion chamber so that the draft opening 9 is near the bottom of such front wall 8 and near the level of the top of the combustion chamber. A lid 17 having a downwardly extending collar 18 is fitted to the top of the hopper and is provided with a handle 19 by which it may be removed.

In applying the invention to the box stove shown in Fig. 5 the slanting floor 4′ is arranged to slant toward the draft opening 9′ which is controlled by the damper 10′. Said floor 4′ terminates in a horizontal shelf 20 that extends below and forms the floor of a horizontal passage 21′ of the combustion chamber 21, the front wall of said chamber being bent down at the front and said passage being connected with the horizontal passage 22 leading to the radiator or flue 23, from the top of which a stack 24 leads. The base of said box stove is provided with a radiating front 25 which contains the passages 21′ and 22 of the combustion chamber, so that the fire from the gas formed by the heat of the combustion which will occur above the slanting floor 4′ will heat said radiator for warming one's feet and also for heating the room into which it projects.

In the form shown in Fig. 6 the chimney 26 is provided with the usual fireplace opening 27 in which the throat 28 is mounted and connected with the radiator front 29 corresponding to the front 25 in Fig. 5. The hopper 30 is fixed to the top of the throat and said throat is pivotally seated at its front at a on the radiator front 29 and extends vertically from the pivotal seat when the hopper is thrown back into the fireplace opening 27; and when the hopper is in such position, the weight thereof will overbalance the hopper to retain it in the fireplace. The top of the hopper is open so that when

the hopper is swung out as shown by dotted lines in Fig. 6 fuel may be poured into said open top.

In practical use the comminuted fuel such as shavings or sawdust may be poured into the hopper and as it falls down it lodges and rests on the slanting floor and fills the inlet and the throat above the slanting floor 4 and also fills the hopper, and thereupon may be ignited through the draft opening by an attendant; the damper 10 and the smoke-stack also being open, the draft carries the fire down through the inlet 3, thence into and across the combustion chamber and on toward the smokestack by which the draft is induced. The material will burn above the slanting floor 4 and below the level of the top 16 of the combustion chamber and the fire will gradually extend up to the contracted port 31 between the hopper and throat, and as the combustion proceeds, gas is produced in the throat and flows downward to be consumed in the combustion chamber 1 by the oxygen admitted through the draft opening 9. As the material rearward from the draft opening 9 burns, ashes escape downward and will be carried by the draft or may fall into the firebox.

In the form shown in Fig. 6 a back wall 32 is provided between the hopper 30 and the chimney flue 33 so that when the rear wall 15′ of the throat 28 rests on the floor 4′ there is no communication between said flue and the top of the hopper.

The throat walls are tapered to give the requisite draft for the operation of molding as is readily understood and in this instance the passage through the throat expands and is flared downward so that the throat walls are gradually reduced in thickness.

The contracted port 31 of the throat may be formed by a ledge *b* projecting inwardly between the downwardly tapering hopper 12 and the downwardly expanding throat 7 and the downward movement of the material in the hopper will be retarded and temporarily held at the port 31 and below that place it will be caused to loosen and fall apart so as to pass down freely to the smooth slanting floor 4 which supports it during combustion and allows the ash to slide down into the combustion chamber. By this construction and arrangement the feeding of the fuel is accomplished by regulating the draft. The more air that is admitted, the more rapidly will the gas be formed and burned and as it burns fresh fuel passes to the expanding throat from the port 31 until the charge in the hopper is exhausted. Then by removing the lid, a new charge may be supplied which becomes ignited at the bottom, by the fire above the floor, and the operation continues as before. By this simple construction the operation of feeding is wholly accomplished by gravity and is entirely controlled and regulated by regulating the draft opening 9.

The hopper 12 is provided at its lower end with a flange 34 that is perforated to receive screws 11 and rests upon the asbestos gasket 35, that rests on the rim of the throat 7 and the inner edge of which helps to form the ledge *b*; said flange 34 being surmounted by a flat frame 36 of sheet metal. The screws 11 extend through the frame 36, flange 34 and gasket 35 and screw into the upper end of the throat 7, thus clamping all together and preventing leakage at that joint.

Sockets 37 are provided at the top of the combustion chamber to receive tenons 38 that extend downwardly from the throat 7 so that the throat can be removed by an upward movement but will normally be held in place by gravity.

In Figs. 5 and 6 some of the parts corresponding to parts shown in Fig. 3 are marked with a corresponding numeral and an indice.

It is understood that the requisite flow of air through the throat may be accomplished by any suitable means without departing from the invention.

I claim:—

1. In combination, a combustion chamber having a radiating front and having a front wall bent down from said radiating front, a horizontal shelf spaced apart from the front wall and dividing the combustion chamber into upper and lower horizontal passages, a slanting floor extending upwardly and rearwardly from said shelf, a downwardly expanding throat having a front wall resting on the radiating front and having a rear wall resting on the slanting floor, there being a draft inlet in the front wall of the throat, and an upwardly expanding hopper fastened to the top of the throat.

2. The combination with means forming a fireplace opening, of a combustion chamber in the lower part of said opening and provided with an inlet, a hopper pivotally mounted in said opening and adapted to discharge fuel into the inlet and to be tilted out from said opening, and means closing the lower end of the hopper from the fireplace opening, said means being operated by tilting of the hopper.

3. The combination, of means forming a combustion chamber having an inlet and having upper and lower passages, a flue having its lower end opening into said lower passage, a slanting floor for the inlet at the rear of the upper passage between said passage and the lower end of the flue, an open bottom throat communicating with the inlet and having one of its walls resting upon the slanting floor, and a hopper mounted on the top of said throat.

4. In combination, a combustion chamber

having a radiating front and having a front wall bent down from said radiating front, a horizontal shelf spaced apart from the front wall and dividing the combustion chamber into upper and lower horizontal passages, a slanting floor extending upwardly and rearwardly from said shelf, a downwardly expanding throat having a front wall pivotally seated on the radiating front and having a rear wall designed to rest on the slanting floor, there being a draft inlet in the front wall of the throat, and an upwardly expanding hopper fastened to the top of the throat.

5. The combination with a chimney having a flue and a fireplace opening therefor, of a combustion chamber having a radiating front that extends out from said opening and having a front wall bent down from said radiating front, a horizontal shelf spaced apart from the front wall and dividing the combustion chamber into upper and lower horizontal passages, a slanting floor extending upwardly and rearwardly from said shelf, a back wall extending up from the slanting floor and separating the opening from the flue, a downwardly expanding throat having a front wall pivotally seated on the radiating front and having a rear wall designed to rest on the slanting floor, there being a draft inlet in the front wall of the throat, and an upwardly expanding hopper fastened to the top of the throat and designed to close into the opening and to open outward from said opening.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 5th day of August 1909.

WILLIAM L. BOXALL.

In presence of—
JAMES R. TOWNSEND,
L. BELLE RICE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."