2 Sheets—Sheet 1.

W. A. GREENE.
Heating Stove.

No. 223,041. Patented Dec. 30, 1879.

Fig. 1.

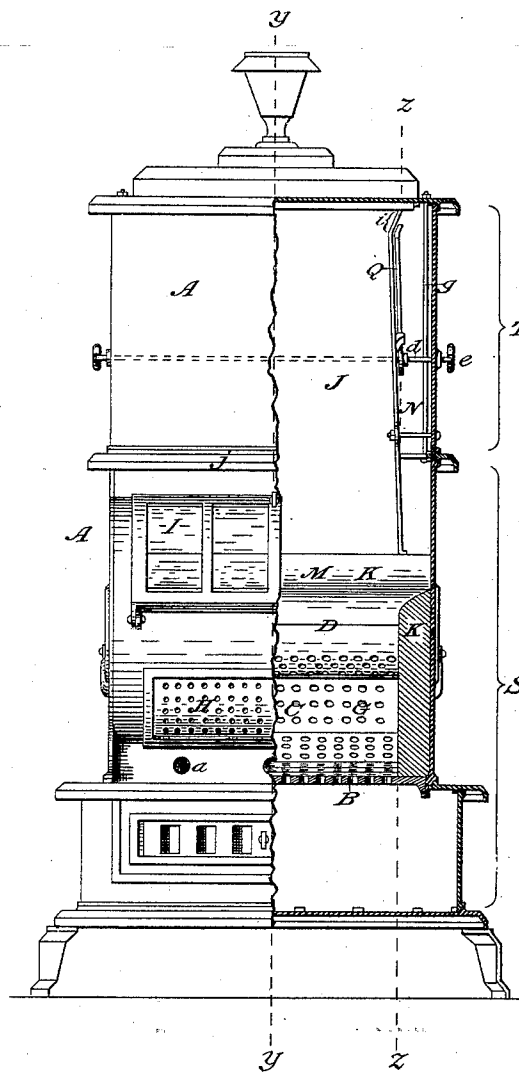
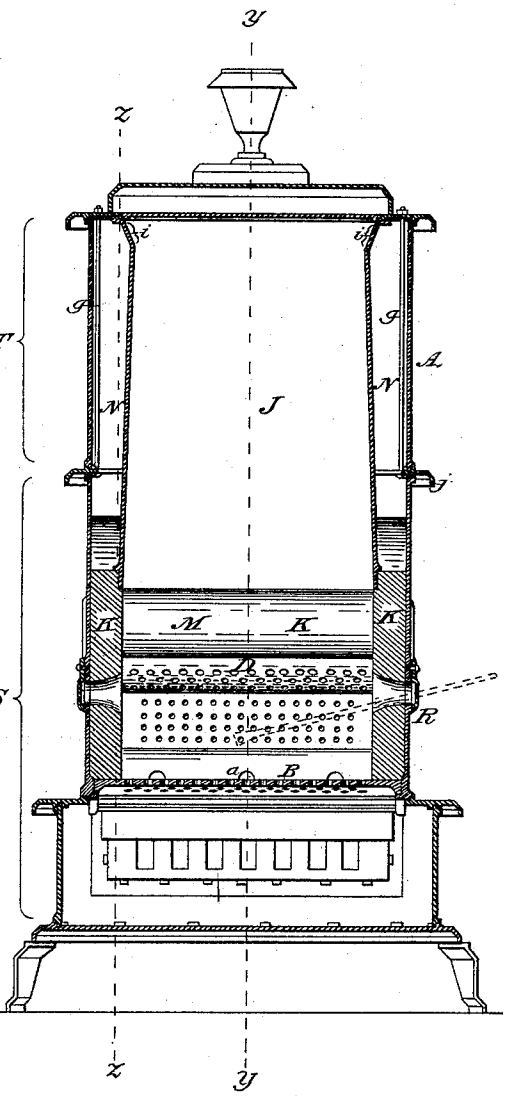


Fig. 2.



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2 Sheets—Sheet 2.

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Fig. 3.

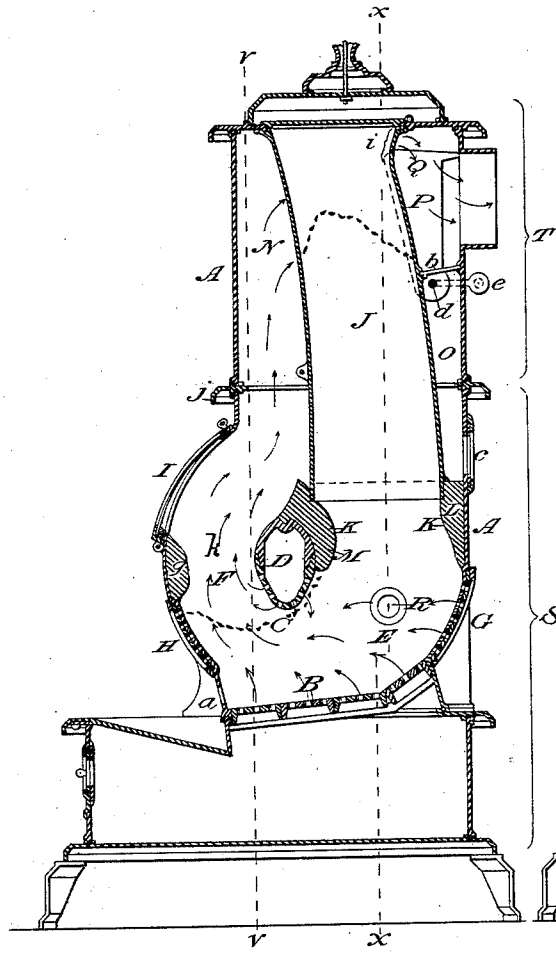


Fig. 4.

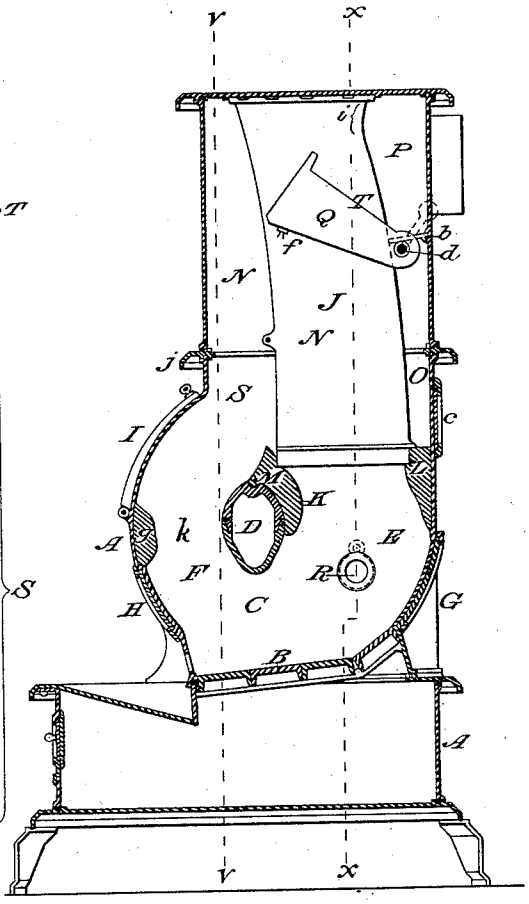
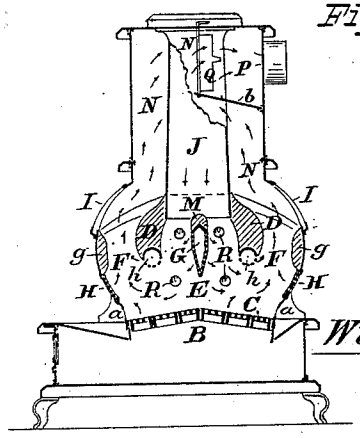


Fig. 5.



Fig. 6.



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UNITED STATES PATENT OFFICE.

WILLIAM A. GREENE, OF ELIZABETHPORT, NEW JERSEY.

IMPROVEMENT IN HEATING-STOVES.

Specification forming part of Letters Patent No. **223,041**, dated December 30, 1879; application filed October 2, 1879.

To all whom it may concern:

Be it known that I, WILLIAM A. GREENE, of Elizabethport, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Magazine Heating-Stoves, of which the following is a specification.

My invention relates most particularly to that class of stoves for burning bituminous fuels whose fire-box is partially divided by a transverse partition into two fuel-burning chambers—a primary chamber, into which the fresh fuel is fed, and in which it is coked, and a secondary chamber, to which the coked fuel is transferred, and in which the combustion is completed. Stoves of this character are shown and described in my Patents No. 209,806, dated November 12, 1878, No. 214,906, dated April 29, 1879, and No. 220,529, dated October 14, 1879, to all of which I here make reference.

My present invention has for its special object to provide the heating-stove which is the subject of my last-named patent with a magazine or reservoir for the fuel; but my improvements may be as applicable to some other forms of stoves as to that.

In the drawings, Figure 1 is a front elevation of a stove embodying my invention, its right half being in section on the plane of the line *v v*. Fig. 2 is a vertical section taken on the plane of the line *x x*, and looking toward the front. Fig. 3 is a vertical mid-section taken on the plane of the line *y y*. Fig. 4 is also a vertical section taken on the plane of the line *z z*. Fig. 5 shows a modification of the partition and shouldered tile; and Fig. 6 is a view similar to Fig. 3, showing a modification of the stove.

Let A A represent the outer walls of the stove, B the grate thereof, C the fire-box, and D a transverse partition extending across the fire-box from one side of the stove to the other, and partially dividing the same into two fuel-burning chambers—a primary chamber, E, and a secondary chamber, F. These chambers are arranged on opposite sides of the partition in substantially the same vertical plane, and over separate portions of the same grate.

G is a perforated plate or register, which admits air to the chamber E, and H is a similar perforated plate or register, which admits air to the chamber F. I is a mica door or window set in the front wall, and communicating with the chamber F, so that the illumination in that chamber may be visible. Below the perforated plate or register H one or more poke-holes, *a a*, are formed in the front wall of the stove.

The above-named elements are all shown and described in my before-mentioned Patent No. 220,529, and form no part of my present invention.

It will be seen by reference to the drawings that in my present construction the combustion-chambers are reversed in position from their arrangement in my previous inventions, the secondary instead of the primary chamber being now placed at the front of the stove, and the products of combustion passing under the partition toward the front instead of toward the rear.

J is a magazine or reservoir for the fuel, extending down from the top of the stove to the primary fuel-burning chamber E. This magazine is shown as inclined forward, its top or mouth being toward the front of the stove, and its bottom or throat being at the back, so as to communicate with the chamber E. It also, by preference, gradually enlarges from or near its mouth to its throat, to keep the contained coal loose and open, and to facilitate its descent; but this conformation is not essential to my invention.

The fuel contained in the magazine descends, as required, into the primary chamber, where it is ignited and coked, after which it is worked forward under the partition D into the secondary chamber, where its combustion is completed, fresh coal descending meanwhile into the primary chamber to take its place.

I am aware that it is not new to provide a stove having two combustion-chambers separated by a partition, with a magazine for the fuel, and make no claim to this feature alone.

K K are the lining plates or tiles of the chamber E, two of which are arranged against and to protect the side walls of the stove, one (also lettered L) against the back wall, and one (also lettered M) against the transverse partition D at the front of this chamber. These lining-plates all rise to about the same height,

and the lower end or throat of the magazine enters between and fits closely against them, so that they serve to steady it and re-enforce it against internal pressure, as well as to protect it from the heat.

The space between the magazine and the outer walls of the stove forms at the sides and front the draft-flue N, and at the back a dead-flue, O, and off-take chamber P, the two latter being separated from each other by a partition-plate, *b*. (Shown in Fig. 3.)

The gases from the flue N enter the off-take chamber at the side and pass out of it through the usual pipe-collar into the stove-pipe. The dead-flue C communicates with the flue N at the sides, and is provided at or near its bottom with a register, *c*, set in the back wall, A, of the stove. The air entering through the register passes through the flue O into the flue N, where it mingles with the products of combustion, and is drawn with them into the chimney, thus reducing the effectiveness of the draft.

In kindling the fire, and at some other times, it is desirable to give the products of combustion the most direct and easy access to the chimney that is possible; but in the ordinary use of the stove it is essential to an economical consumption of the fuel that the draft be somewhat retarded, taking it a longer time to reach the chimney, in order that it may radiate more of its heat than when it passes off immediately. This has been heretofore accomplished by the use of a circuitous flue, through which, in the ordinary use of the stove, the consumed gases must pass to reach the chimney, but which, when the fire is being kindled, can be discarded, and the gases permitted to enter the chimney by a more direct passage. This construction is shown in each of my three patents hereinbefore referred to.

I have aimed in my present invention to provide an equally effective means of retarding the draft, which shall be more compact and less expensive, rendering the stove smaller, lighter, and more simple. This I accomplish by the following-described arrangement of apparatus:

At each side of the off-take chamber P, where the gases enter from the flue N, I arrange a damper, Q, which, when fully shut, partially closes the entrance to the said chamber, and serves to check and retard the flow of gases thereinto, as seen in Fig. 3. These dampers Q Q, I have shown as mounted upon a single rod, *d*, extending horizontally across from one side of the stove to the other, just behind the magazine, and provided with bearings in the outer walls, so that it is permitted to oscillate a short distance. The ends of the rod outside of the stove may be provided with a weighted handle or counterpoise, *e*, as shown, to hold the dampers in position when shut if it is found that they tend to fall back and open themselves. I also provide a stop or ledge, *f*, (shown in Fig. 4,) to limit the motion of the dampers and sustain them when opened.

This construction and arrangement of the dampers, although the preferable one, is not essential to their efficient operation. They may be hinged like doors to the back wall of the stove and operated by a handle from above, as shown in Fig. 6; or they may be pivoted after the manner of a butterfly-valve or stove-pipe damper; or they may be hung upon horizontal rods and adapted to be moved toward or from the entrance to the off-take chamber, the only essential being that when fully shut they shall only partially close the entrance to the off-take chamber, and that they can be opened or removed sufficiently therefrom to permit free and unobstructed communication between the flue N and the chamber P.

The partition D is shown as hollow and perforated along its lower side, its ends opening outside the walls of the stove. The partition thus forms an air-duct for drawing air from the outside of the stove and discharging it in jets into the fire-box to aid in supporting combustion. This air-duct being shown in my Patent No. 220,529, I make no claim to it in this. In Figs. 5 and 6 it is shown as a perforated pipe (lettered *h*) at the bottom of the partition D.

The side lining plates or tiles K K extend from the chamber E forward into the chamber F and to the front wall of the stove. A tile, *g*, is also arranged against the front wall, to protect the same between the perforated portion H and the mica door I, which, in my present construction, are separated from each other a short distance. The tile *g* is thick and projects toward the partition D, which is also thickened at this point, and the two form a contraction or throat, *k*, through which the gases from the fuel and the uncombined air which has entered through the grate B, register H, and partition D are compelled to pass to reach the flue. By the slight contraction of this throat *k* the air and gases are forced into close contact with each other as they pass through it, and their union is rendered more thorough than would be the case were no throat employed. The throat *k* is not, however, so greatly contracted as to materially choke or retard the draft.

It will be seen by referring to Figs. 3 and 4 that the tile M is formed with a rounded shoulder at its junction with the magazine, projecting some distance under the throat of the latter. This shoulder serves to retard the descent of the coal from the magazine into the fire-box by slightly choking the passage or opening. The coal is thus closely compacted at this point, while perfectly loose and open above. The purpose of this construction is twofold: first, by choking the coal at the mouth of the magazine and checking its descent the greater part of its weight is taken off the burning fuel in the combustion-chamber, and the latter is left loose and open, so that it may burn freely; second, by compacting the coal at the mouth of the magazine the

entrance of air and of the gases of combustion into the magazine is prevented, and the coal in the latter is kept from ignition. It is of course necessary to the accomplishment of this result that the magazine should have tight sides and a close-fitting cover, so that the only possible entrance for air or gases is through its throat.

I am aware that it is not new to choke the throat of a magazine for these purposes, and claim only my specific construction, or its substantial equivalents, by which the choking is effected.

The back tile, L, which is arranged opposite the tile M, is cut out or beveled off toward its lower edge. This permits the coal from the magazine to fall close against the perforated plate or register G, and facilitates the loosening of the coal below where it chokes at the throat of the magazine. The projecting tile M assists the former operation by directing the coal toward the back wall as it descends, thus throwing the green fuel to the back of the primary chamber, whence it can be worked forward under the partition and into the secondary chamber as required.

The lining plate or tile M forms virtually a part of the partition D, and is so arranged as to cover the rear side of the same and protect it from the intense heat in the chamber E. It is shown in Fig. 3 as resting against and supported by the partition, a shoulder along its upper edge fitting into a groove in the top of the partition, and its ends resting in recesses in the side tiles. It is necessary that this tile should be strongly supported, for it receives a large part of the weight of the fuel in the magazine. In Fig. 5 the tile M and partition D are shown as made in one piece.

It will be seen by an examination of Fig. 2 that the throat of the magazine is the full width of the primary fuel-burning chamber, and that the side tiles or lining-plates of the latter form an uninterrupted continuation of the side walls of the former, there being no intervening space and no shoulder or ledge at their junction, and that they extend down from the throat of the magazine to the surface of the grate. The lateral outline of the magazine and fire-box is thus nearly uniform throughout the entire course of the coal, the object being to disturb the mass of fuel as little as possible, that it may burn uniformly throughout the entire width of the stove.

The lateral downward enlargement of the magazine is preferable, but not essential, and from the point where the magazine joins the fire-box the width of the mass of fuel remains uniform.

I prefer that all the tiles K K should be recessed to receive the ends of the magazine-walls, that the inner surfaces of the magazine and tiles may be flush with each other.

The tiles should extend up in contact with the magazine-walls a sufficient distance to protect the latter from the extreme heat generated in the fire-chamber, which would otherwise burn out the lower portion of the magazine and render it useless.

In some cases it may be necessary to continue the tiles to a greater height than that shown, in order to fully protect the magazine; or, if preferred, they may be arranged inside its walls instead of outside, an enlargement being provided in the throat of the magazine to receive them.

In one or both side walls of the primary chamber E, I form a poke-hole, R, through which a poker or slicing-bar may be passed, as shown by dotted lines in Fig. 2, to break up and loosen the fuel in that chamber, and to push it forward into the chamber F, when it has become coked, or when more coal is required in the primary chamber.

The bar or poker is used as a lever, being vibrated laterally, with the side of the hole as its fulcrum.

It will be seen by reference to Figs. 3 and 4 that the poke-hole R is arranged beneath the magazine J, where the end of a poker inserted through the hole can be readily moved into the throat of the magazine.

In burning soft coal the heat from the fire-chamber is apt to cake the fuel in the throat of the magazine and choke the same. When this occurs the throat may be cleared by the employment of the poker, inserted through the hole R, using it to break the cake of fuel and to pull the coal down into the fire-box.

The poke-hole R may be arranged somewhat higher or lower than where shown without materially impairing its usefulness; or there may be two poke-holes—one above, through which to manipulate a poker to break the cake at the throat of the magazine, and one below, through which to manipulate a poker to push forward the coked fuel, as shown in Fig. 6.

I am aware that a magazine-stove having a single fuel-burning chamber or fire-pot has been provided with a poke-hole through the wall of the fire-pot near the grate, so formed and arranged that the end of a straight poker inserted through it could not enter the throat of the magazine, and I therefore make no claim to the poke-hole except when used in a stove having two fuel-burning chambers on opposite sides of a transverse partition, or when the hole is so placed that a poker thrust through it can be inserted into the throat of the magazine.

To facilitate the removal and replacement of the tiles and the inspection of the bottom portion of the magazine, I construct the stove in two parts, the separation of which exposes these elements. The lower portion (lettered S) comprises the ash-pit and fire-box, and contains the partition D, the grate-sections, and the lining-tiles. The upper portion (lettered T) comprises the flues N and O and the off-take chamber P, and contains the magazine J and dampers Q Q. Between the two portions S and T a horizontal ring-plate, *j*, is interposed, and to this each portion is secured by bolts.

By disconnecting the bolts *g g*, which extend

from the ring-plate *j* to the stove-top, the upper part, T, may be lifted off easily, carrying the magazine with it, and permitting the inspection and removal of the tiles.

Fig. 6 shows a double stove, or one with two secondary fuel-burning chambers, and a central magazine arranged to burn in both directions simultaneously. The throat of the magazine enters between two partitions, D, and the back tile, L, is dispensed with, as is also the rear register, G. In place of the latter an additional air-inlet tube may be provided, as shown at G, and the top of this may be protected by a tile, M, as shown, if deemed necessary. The thickness of this tile serves the same purpose as the shouldered tile M in the previous figures, and the partitions D D are consequently unprovided with shoulders. As shown, these partitions are formed of refractory material, the air-duct *h* being provided for by embedding a perforated tube in the bottom edge of the partition, in the same manner as shown in Fig. 5.

It will be seen that the coal from the magazine divides and passes each side of the tube G, and the separate portions so divided pass in opposite directions under the partitions and into the secondary chambers F F, which are arranged on opposite sides of the stove. The dead-flue O is also dispensed with in this construction, and the partition or plate *b* is arranged across the back draf-tflue, and extended through the side draf-tflue toward the center of the stove, as shown, so as to compel the gases from the rear chamber, F, to pass toward the front of the stove before entering the off-take chamber.

I claim as my invention—

1. The combination of the primary and secondary fuel-burning chambers E and F, arranged over the grate B, with the magazine J, extending down to and communicating with the primary chamber, and the refractory side lining-tiles, K K, of that chamber, extending above the bottom of the magazine in close contact with the same, and their inside surfaces arranged flush with the inside surfaces of the side walls of the magazine, substantially as set forth.

2. The combination of the magazine J, the primary fuel-burning chamber E, the secondary fuel-burning chamber F, the perforated air-inlet plate G, admitting air to the primary chamber, and the lining-tiles K K K K of the primary chamber, forming a downward continuation of the magazine on all sides, substantially as set forth.

3. In a heating-stove, the combination of the grate B, the partition D, the fuel-burning chambers E and F, arranged on opposite sides of the partition and over opposite ends of the grate, and the magazine J, communicating with the chamber E, and its throat partially closed or choked by the projection thereunder of one of the walls or lining-tiles of that chamber, whereby the descent of coal from the magazine is slightly impeded, substantially as set forth.

4. The combination of the fuel-burning chambers E and F, the partition D, and the magazine J with the shouldered tile M, arranged against and to protect the partition, or formed as a part of the same and projecting under the throat of the magazine sufficiently to slightly impede the passage of coal therefrom, substantially as set forth.

5. The combination of the fuel-burning chamber E, the magazine J, and the air-supply plate G with the lining-tile M, arranged on one side of the chamber and projecting under the throat of the magazine, and the lining-tile L on the opposite side of the chamber, extending from the throat of the magazine down to the plate G, and beveled gradually from its upper to its lower edge, substantially as and for the purposes set forth.

6. In a heating-stove, the combination of the upright walls or shell A A, the fire-box C, the transverse partition D, and the magazine J, the latter extending from the top or upper part of the stove down to and communicating with the portion of the fire-box on one side of the partition, and formed of less width than the shell, whereby a space or flue, N, is formed between it and the shell for the passage of the products of combustion from the portion of the fire-box on the opposite side of the partition to the stove-pipe, substantially as set forth.

7. A magazine-stove which consists of an outer shell, A A, a transverse partition, D, primary and secondary fuel-burning chambers E and F, and a magazine, J, which extends down from a feeding-opening in the top of the outer shell, A A, to the chamber E at the rear, these several parts being arranged substantially as shown and described, to form a draft-flue, N, in front and at the side of the magazine, and an off-take chamber, P, behind the same.

8. The combination, with the primary and secondary fuel-burning chambers E and F and the magazine J, of the draft-flue N, off-take chamber P, and dead-flue O, the latter separated from the off-take chamber by the plate *b*, and provided with the register *c*, substantially as set forth.

9. The combination, with the draft-flue N and off-take chamber P, of a damper, Q, adapted to be projected into the entrance from the flue to the off-take, but incapable of entirely closing that entrance, whereby the draft may be impeded and the fire caused to burn more slowly, substantially as set forth.

10. The combination of the magazine J and outer walls, A A, of a stove, arranged to form a draft-flue, N, in front and at the side of the magazine, and an off-take chamber at the rear of the stove, of a damper, Q, arranged, when not in use, against and parallel with the side of the magazine, and adapted to be projected into the entrance from the flue to the off-take, and to partially but not entirely close that entrance, whereby the draft may be diminished, substantially as set forth.

11. The combination, with the magazine J, flue N, and off-take chamber P, of the dampers Q Q, arranged against the sides of the magazine J, mounted on a rod, *d*, and adapted, when turned by the rod, to be moved into, and to partially close, the opening between the flue and off-take chamber, substantially as set forth.

12. The combination of the primary and secondary fuel-burning chambers E and F, arranged on opposite sides of the partition D, and over separate portions of the grate B, with the air-inlet plate H and contracted throat *k*, the latter formed between the tile *g* and partition D, substantially as set forth.

13. The tile *g*, arranged against the wall of the secondary fuel-burning chamber F, between the air-inlet plate H and the illuminating-door I, and projecting sufficiently toward the partition D to form a throat or contraction, *k*, substantially as and for the purposes set forth.

14. A stove constructed with primary and secondary fuel-burning chambers E and F, arranged on opposite sides of a transverse partition, D, and over separate portions of the same grate B, and provided with a poke-hole, R, formed through the side wall of the primary chamber, for the admission of a poker to push the fuel from the primary into the secondary chamber, substantially as set forth.

15. In a magazine-stove which consists, essentially, of the combination of the fuel-burning chamber E with the magazine J, extending down thereto and communicating therewith, a poke-hole, R, formed in the wall of the chamber E below the throat of the magazine, and of the size, shape, and location substantially as set forth, whereby the end of a straight poker or slicing-bar inserted through it can be thrust up into the throat of the magazine, and moved or worked about therein to clear the same.

16. The combination of the grate B, the transverse partition D, the primary and secondary fuel-burning chambers E and F, arranged on opposite sides of the partition and over separate portions of the grate, and the magazine J, communicating with the chamber E, with one or more poke-holes, R, formed in the side wall or walls of said chamber beneath the throat of the magazine, substantially as set forth.

17. As a two-part magazine-stove, the combination of the part S, comprising the primary and secondary fuel-burning chambers, and containing the grate, the transverse partition, and the lining-tiles, with the part T, comprising the flues and off-take chamber, and containing the magazine J, and with the horizontal ring-plate *j* and fastening-bolts *g g*, substantially as and for the purposes set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

WILLIAM A. GREENE.

Witnesses:

ARTHUR C. FRASER,

HENRY CONNETT.