

April 27, 1954

E. J. BLUMSON

2,676,583

DOWNDRAFT STOVE

Filed March 8, 1949

5 Sheets-Sheet 1

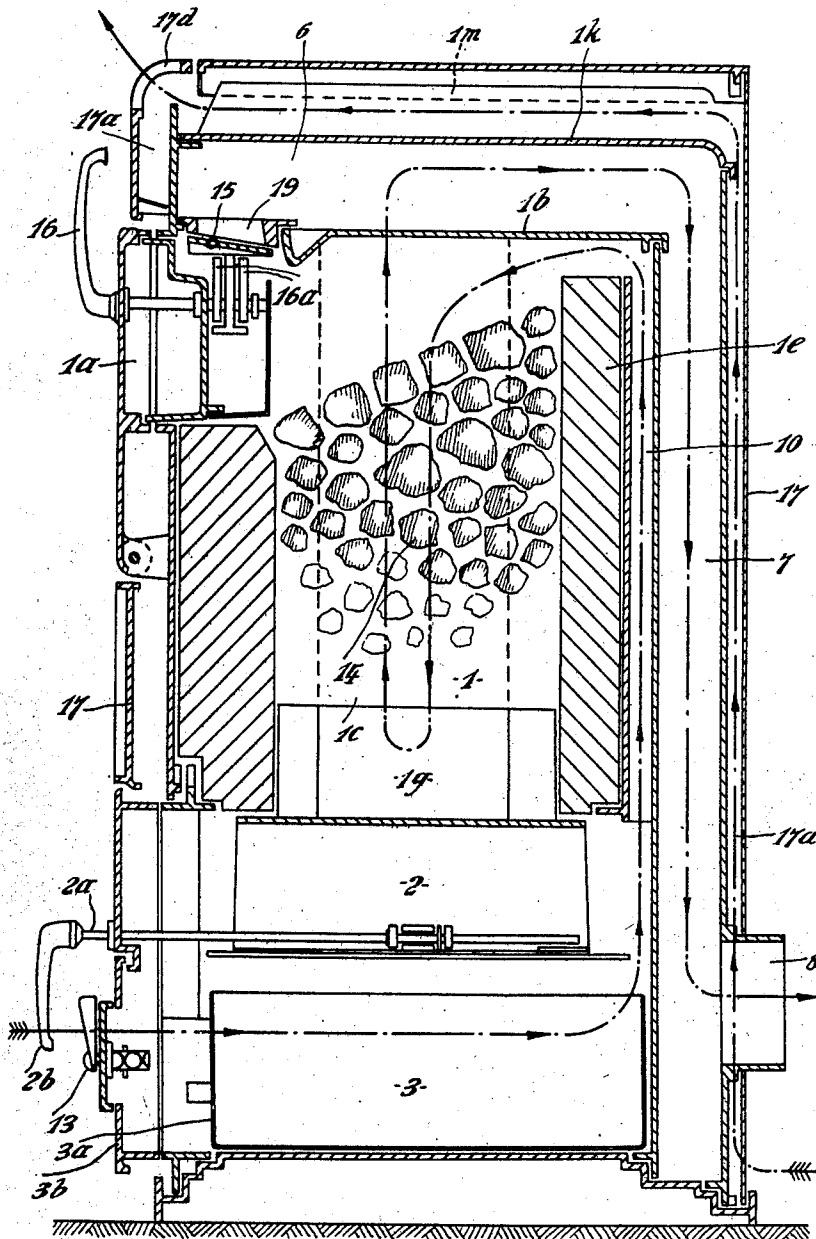


Fig. 1.

Inventor:
Ernest James Blumson,

by: Pierce, Scheffler & Parker,
Attorneys.

April 27, 1954

E. J. BLUMSON

2,676,583

DOWNDRAFT STOVE

Filed March 8, 1949

5 Sheets-Sheet 2

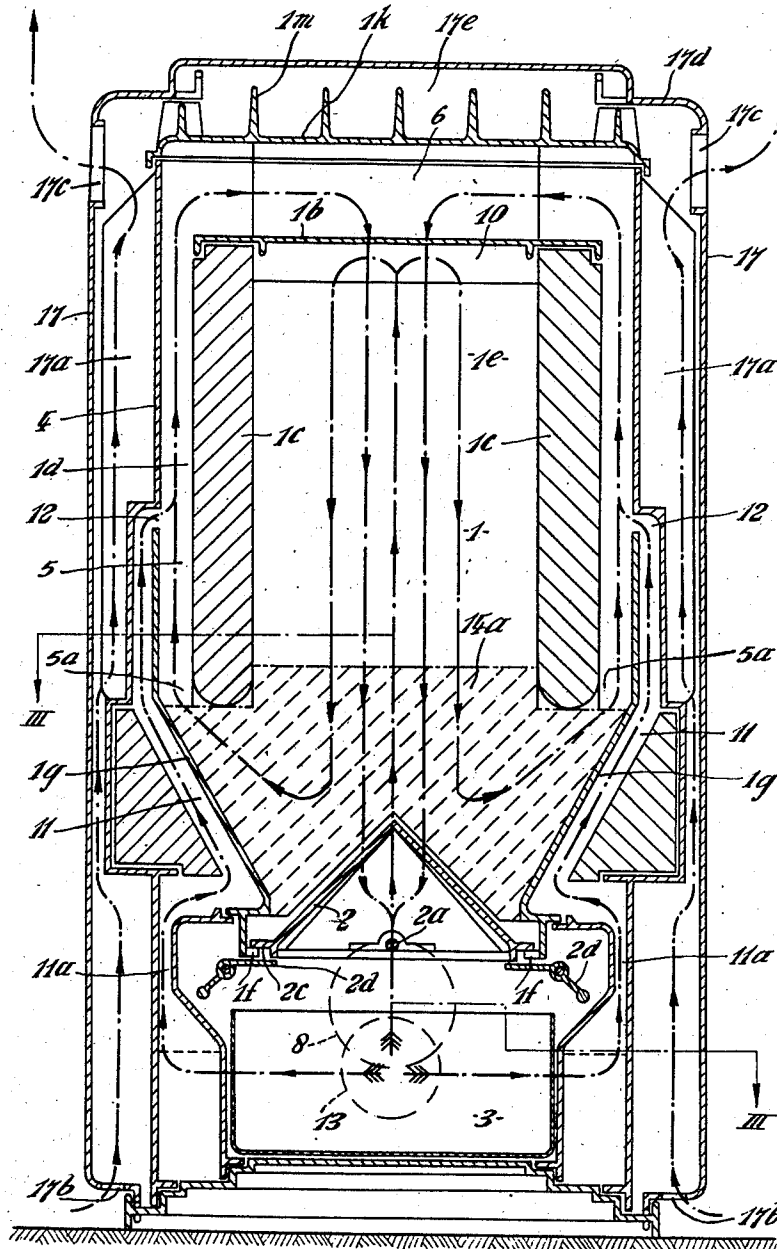


Fig. 2.

Inventor:
Ernest James Blumson,

By: *Pierce, Scheffler & Parker,*
Attorneys.

April 27, 1954

E. J. BLUMSON

2,676,583

DOWNDRAFT STOVE

Filed March 8, 1949

5 Sheets-Sheet 3

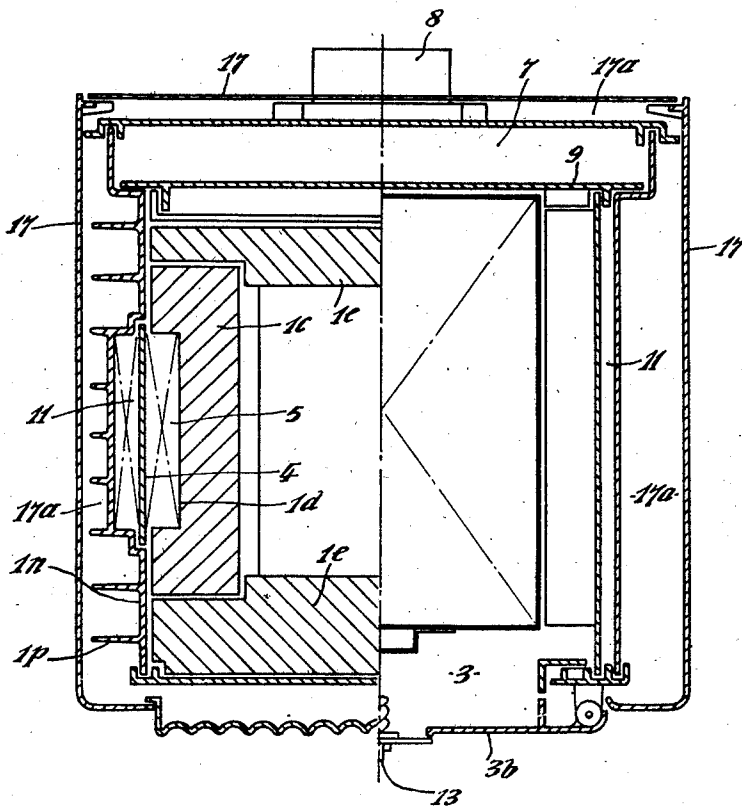


Fig. 3.

Inventor:

Ernest James Blumsom,

By: Pierce, Scheffler & Parker,
Attorneys.

April 27, 1954

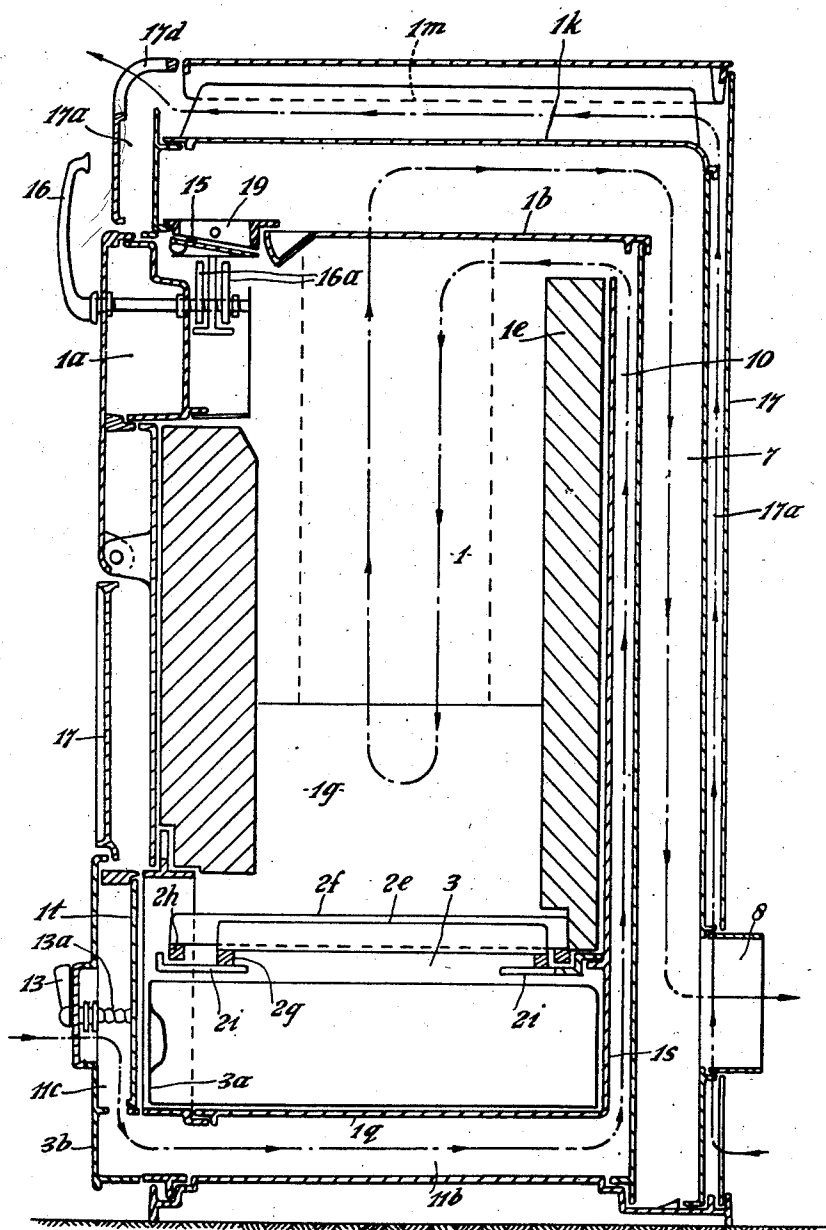
E. J. BLUMSON

2,676,583

DOWNDRAFT STOVE

Filed March 8, 1949

5 Sheets-Sheet 4



April 27, 1954

E. J. BLUMSON

2,676,583

DOWNDRAFT STOVE

Filed March 8, 1949

5 Sheets-Sheet 5

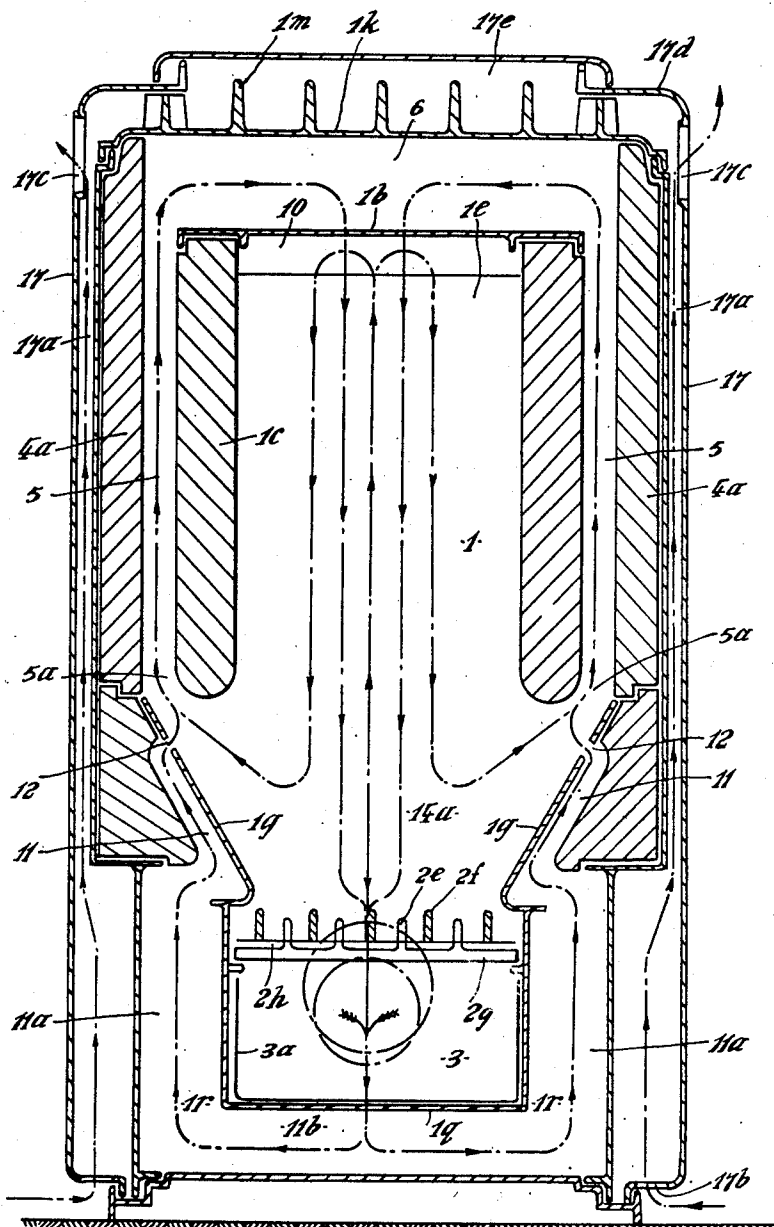


Fig. 5.

Inventor:
Ernest James Blumson,

By: Pierce, Schaffler & Parker,
Attorneys.

UNITED STATES PATENT OFFICE

2,676,583

DOWNDRAFT STOVE

Ernest James Blumsom, London, England, assignor to Allied Ironfounders Limited, London, England, a British company

Application March 8, 1949, Serial No. 80,263

Claims priority, application Great Britain March 16, 1948

4 Claims. (Cl. 126-76)

1

This invention relates to stoves of the kind in which a fuel hopper extends upwardly from a combustion zone to which solid fuel contained in the hopper feeds by gravity, and in which the whole of the primary air for combustion passes downwardly through the column of fuel maintained in the hopper to the combustion zone, while secondary air is admixed with the products of combustion passing from the combustion zone to effect complete combustion of the smoke and/or soot-forming products.

In constructions of stoves of this kind heretofore proposed, the primary air and secondary air are admitted to the stove structure through separate inlets which are separately controllable. The rate of combustion of the stove is determined by control of the inlet for primary air, and the inlet for secondary air is separately controllable to achieve the desired conditions of complete combustion.

The present invention has for its object to provide an improved construction of stove of the kind referred to, wherein any fuel, but in particular bituminous coal or other highly volatile solid fuel, may be burned with a minimum of smoke or soot, and in general more efficient combustion may be obtained without the necessity of relative adjustment of separate air inlets according to the desired rate of combustion.

According to the present invention, in a stove of the kind referred to, air is admitted through a single controllable air inlet to a chamber below the grate or other fuel support, in which chamber it is pre-heated and from which it is distributed in proportions determined by the relative cross-section of distributing passages or flow-control openings therein to supply the primary air to the top of the hopper and the secondary air to the products of combustion passing from the zone of combustion.

In one embodiment the air is admitted to and distributed from an ashpit chamber disposed below an imperforate fuel support structure. The imperforate fuel support structure may be mounted to be capable of reciprocation under the control of external actuating means, counter-weighted flap members being arranged so as to seal ash outlet passages between lateral edges of the fuel support structure and the adjacent structure of the stove.

In another embodiment, a perforate grate structure is utilized in conjunction with a sealed ashpit preventing access of air thereto, and the air is admitted to and distributed from a chamber extending around the ashpit.

2

The invention is hereinafter described, by way of example, with reference to the accompanying diagrammatic drawings, in which—

Fig. 1 is a sectional side elevation illustrating a continuous combustion convection heater constructed in accordance with the present invention;

Fig. 2 is a sectional front elevation corresponding to Fig. 1;

Fig. 3 is a section on the line III—III of Fig. 2;

Fig. 4 is a view similar to Fig. 1 illustrating a modification; and

Fig. 5 is a sectional front elevation corresponding to Fig. 4.

In carrying the invention into effect according to one embodiment, and with reference to Figs. 1 to 3 of the accompanying diagrammatic drawings, a continuous burning convection heater comprises a vertically disposed chamber 1 of rectangular cross-section forming a fuel hopper in which is established a column of fuel that feeds progressively downward to a combustion zone 14a located at the lower end of the chamber 1, said chamber being provided with a door 1a at the front for charging the hopper, and a flat roof 1b at the top. At the bottom the fuel is supported on a substantially imperforate fuel support 2 or floor mounted above an ashpit 3 provided with a removable ashpan 3a. The fuel support 2 may be of inverted V cross-section, as shown in Fig. 2, and may be mounted upon slides so that by reciprocation of a bar 2a connected to the fuel support 2 and provided with external actuating means, such as a handle 2b, the fuel support 2 may be agitated by a to and fro movement. The lower lateral edges of the fuel support 2 have projecting teeth 2c or the like which slide over similar members 1f projecting from an adjacent part of the stove, the structure thereby providing grids for ash-riddling. In order that the ash outlets may be normally sealed to prevent entry of air, counter-weighted flaps 2d are arranged to contact the lower edge of the fuel support 2 and of the adjacent part of the stove structure when the fuel support 2 is in the intermediate position between the limits of its movement.

The side walls 1c of the chamber 1 are constituted by slabs of suitable refractory material of substantial thickness. At the outer side of these refractory side walls 1c, channels 1d are provided, said channels 1d being covered by plates 4 so as to form vertical flues 5 which communicate at a suitable height above the grate 2 with the combustion zone through inlets 5a. At the

top the said flues 5 communicate with a passage 6 extending over the roof 1b and leading to a flue 7 communicating with a chimney outlet 8.

The rear wall 1e of the chamber 1, which wall also may be of refractory material, has an outer wall 9 spaced therefrom to provide an upwardly extending primary air duct 10 at the back of the chamber 1 and extending the full width thereof. This duct 10 at the bottom communicates with the ashpit 3 below the fuel support 2 and the rear wall 1e of the chamber 1 extends short of the top of the side walls 1c so that the duct 10 is in communication with the chamber 1 at its upper part. Passages 11a for secondary air also extend upwardly from the ashpit 3 and communicate with passages 11 disposed externally of inclined walls 1g defining the combustion zone and leading through openings 12 to the flues 5, the openings 12 in this embodiment being suitably positioned above the inlets 5a from the combustion zone so that the secondary air from the passages 11 is introduced at zones which normally are incandescent, thereby ensuring complete combustion of volatile or smoke and soot-forming products.

In accordance with this invention all of the primary air for combustion with the solid fuel and all of the secondary air for ensuring complete combustion of the volatile or smoke and soot-forming products in the flues is admitted to the ashpit 3 through a single air inlet under the control of a suitable damper 13 which may be mounted on an ashpit door 3b. A primary portion of this air passes through the duct 10 behind the chamber 1 to the top of the chamber and thence downwardly through the fuel 14 so as to carry volatile products of combustion to or into the hot zone 14a of the fire. Furthermore, a secondary portion of the air from the ashpit 3 also passes up through the passages 11a and 11 to the flues 5, the primary and secondary portions of the air being distributed on these two main paths in suitable proportion by suitable determination of the relative cross-section of the respective air passages or of flow control openings associated therewith at any suitable point.

In the modification illustrated in Figs. 4 and 5, the general construction of the stove is similar to that shown in Figs. 1 to 3 except that the plates 4 of Fig. 2 are replaced by refractory slabs 4a. Instead, however, of providing an imperforate fuel support structure for preventing passage of air upwardly through the fuel supported thereon, a perforate grate structure is provided comprising grate bars 2e, 2f fixed on cross members 2g, 2h respectively, said cross members being supported on fixed members 2i, and in order to prevent upward flow of air through the fuel on the grate, said grate is enclosed in a sealed ashpit 3 having side walls 1r, a rear wall 1s, bottom wall 1q and removable front panel 1t, the latter being held in place by suitable means, such as a spring 13a associated with the damper 13 on the door 3b. This construction of ashpit provides an air passage 11c at the front extending downwardly from the damper 13, an air passage 11b extending beneath the ashpit, air passages 11a extending up the sides of the ashpit, and at the rear a direct connection to the duct 10, the said air passages providing an air supply chamber from which the air flow is distributed to the passages 11 and to the duct 10. It will be noted that the outlets 12 from the passages 11 are disposed in the inclined walls 1g and communicate with zones in the vicinity of the inlets 5a to the flues 5. The two

grate bar structures 2e, 2f may be relatively movable by any suitable means for effecting ash riddling.

In both embodiments, in order to obviate out-rush of flame or smoke when the door 1a is opened for charging the hopper, a valve plate 15 is supported by means of cams 16a mounted upon or operated by a locking handle 16 on the door 1a so that when the handle 16 is turned to unlock the door 1a, the valve member 15 is permitted to drop so as to open an outlet 19 and thus establish direct communication between the upper part of the chamber 1 and the through passage 6 across the top thereof before the door 1a is opened.

The stove structure is enclosed in an outer casing 17 providing air passages 17a for convection currents, said passages 17a having inlets 17b at the bottom and outlets 17c at the top. The upper part 17d of the casing may have an opening 17e and the top 17k of the stove structure may be provided with fins 17m for more effective radiation of heat therefrom. As shown more particularly in Fig. 3 the side walls 17n of the stove structure may be provided with fins 17p.

It will be understood that, owing to the arrangement of the air passages in or adjacent walls of the vertical chamber, the air supply is effectively pre-heated.

Furthermore, it will be understood that the invention is not limited to the particular embodiment hereinbefore described. For example, instead of the air passages 11 extending upwardly from the ashpit 3 to the flues 5, they may extend downwardly from the upper part of the air duct 10 so that in effect the subdivision of the air supply takes place at the upper part of the chamber 1. Moreover, the grate may be of conventional construction so that the air supply is distributed in three paths, i. e. upwardly through the grate in addition to the two main paths before referred to.

Furthermore, it will be understood that the invention is applicable to other constructions of stoves of the kind referred to, and the arrangement and disposition of the air passages may be modified in various ways.

I claim:

1. A magazine-feed solid fuel burning stove of the down draft type comprising an upright chamber constituting a hopper for receiving a column of the fuel, a support at the lower end of said chamber for the lower end of the fuel column to establish a combustion zone in the fuel column limited to the lower part thereof on the support, wall members forming an air distributing chamber beneath said fuel support, adjustable air inlet means to said distributing chamber through which the entire air for the stove passes, means preventing air flow upwardly through said fuel support into the combustion zone, air passageways extending from said distributing chamber to the top of said upright chamber through which the whole of the primary air for combustion passes upwardly and thence downwardly through the column of fuel in said upright chamber to the combustion zone, exhaust passageways leading from said combustion zone to the exterior of said stove through which the products of combustion are conveyed, and passageways leading from said distributing chamber to the vicinity of the entrance ends to said exhaust passageways for introducing secondary air for burning off any unburned combustible products entering said exhaust passageways.

2. A magazine-feed stove as defined in claim 1

5

wherein said fuel support is imperforate, being provided with normally closed ash outlet passages between lateral edges of said fuel support and adjacent members of the stove, and said air distributing chamber comprises an ashpit disposed below said fuel support and ash outlet passages, said ashpit being normally walled-off from said combustion zone.

3. A magazine-feed stove as defined in claim 2 wherein said imperforate fuel support is provided with means whereby the same may be reciprocated and wherein counter weighted flap members are used to normally close off said ash outlet passages.

4. A magazine-feed stove as defined in claim 1 wherein said fuel support is perforated, an ash pit disposed beneath said perforated fuel support normally communicates with said combustion zone, said ash pit being sealed against entry of

6

air, and said air distributing chamber extends around said ash pit.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
231,163	Hamlin	Aug. 17, 1880
573,170	Watson	Dec. 15, 1896
603,967	Piron	May 10, 1898
725,228	Deprez et al.	Apr. 14, 1903
2,399,814	Martin	May 7, 1946

FOREIGN PATENTS

Number	Country	Date
224,116	Germany	Jan. 10, 1910
422,302	France	Jan. 16, 1911
50,816	Norway	May 9, 1932
808,783	France	Nov. 24, 1936