

No. 698,803.

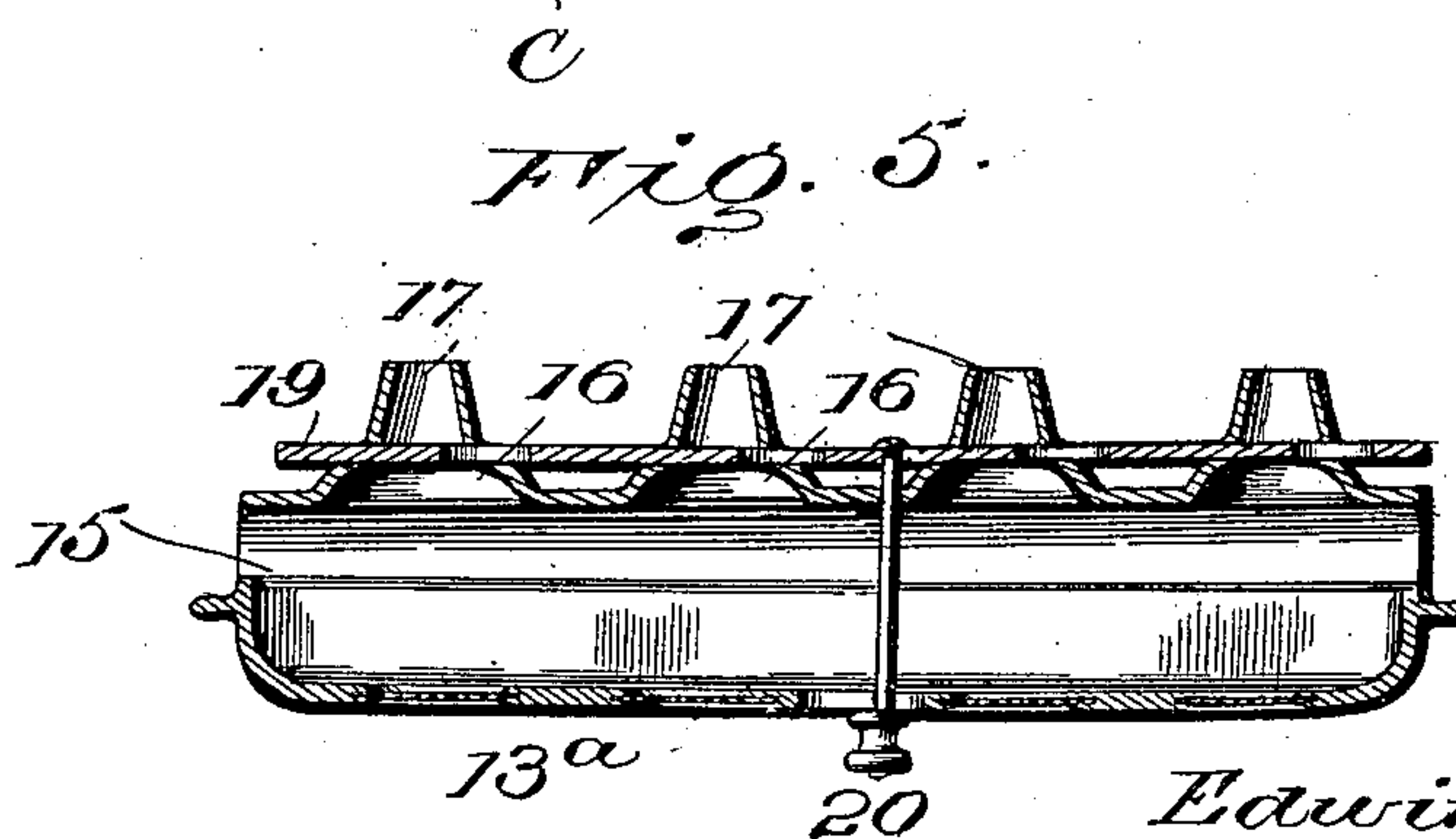
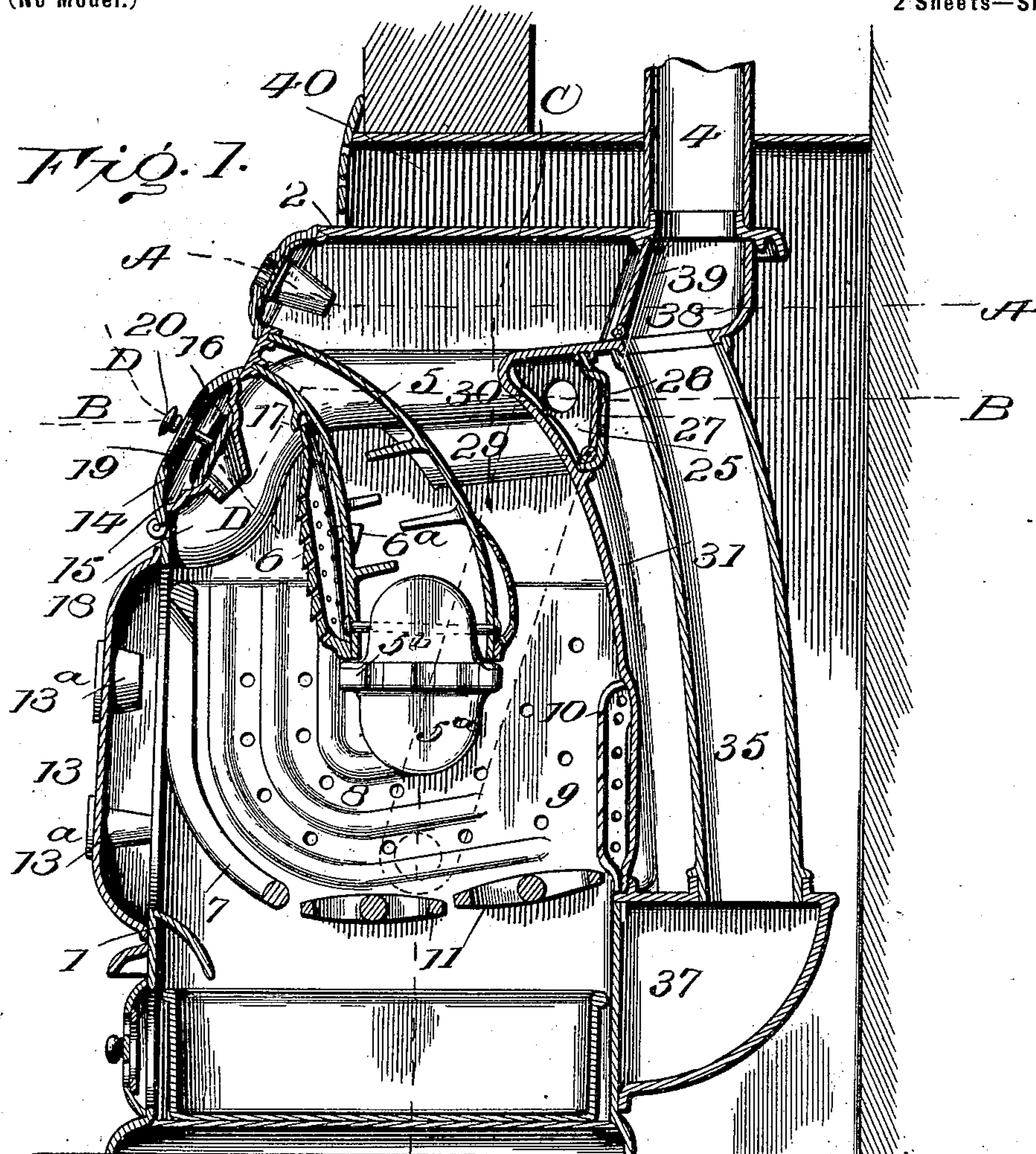
Patented Apr. 29, 1902.

E. R. CAHOONE.  
STOVE.

(Application filed Mar. 5, 1901.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses

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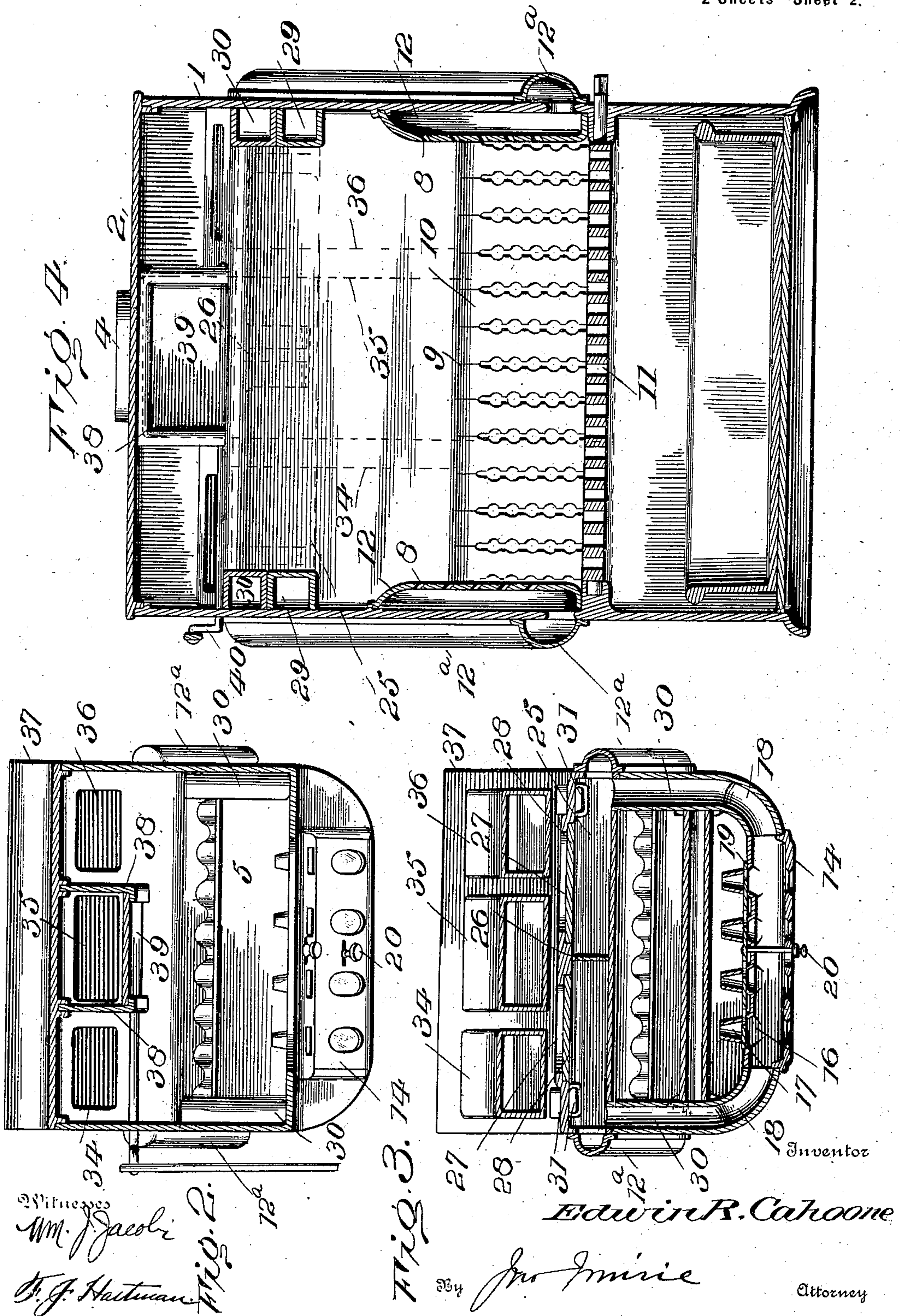
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2 Sheets—Sheet 2.





# UNITED STATES PATENT OFFICE.

EDWIN R. CAHOONE, OF NEWARK, NEW JERSEY.

## STOVE.

SPECIFICATION forming part of Letters Patent No. 698,803, dated April 29, 1902.

Application filed March 5, 1901. Serial No. 49,820. (No model.)

*To all whom it may concern:*

Be it known that I, EDWIN R. CAHOONE, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented new and useful Improvements in Stoves, of which the following is a specification.

This invention relates to improvements in downdraft heating-stoves for burning soft or bituminous coal, and has reference more especially to that class of stoves wherein a pendent air-duct is used to divide the fuel-chamber to direct air through the bed of the fuel.

The object of the present invention is to arrange an air heating and supply chamber on the outside of the stove-casing at a point where it will be in the path of the ascending heat, whereby the air in and the air going into said chamber will become highly heated.

A further object of the invention is to provide special means for observing the condition of the fuel in rear of the air-duct and specific means whereby the air-duct shield may be readily and conveniently attached and detached.

Many other objects and advantages will become apparent in the description to follow and will be particularly pointed out in the claims.

In the drawings forming a part of this specification, Figure 1 is a vertical section of my improved stove on the line E E of Fig. 3. Fig. 2 is a cross-section of the same on the line A A of Fig. 1. Fig. 3 is a similar section on the line B B of Fig. 1. Fig. 4 is a transverse vertical section on the line C C of Fig. 1, omitting the air-duct. Fig. 5 is an enlarged section through the feed-door on the line D D of Fig. 1.

The numeral 1 designates a stove-casing of any desired shape best adapted for the accommodation of the parts about to be described.

2 indicates the stove-top, and 4 the usual flue for the escape of the products of combustion.

Suspended in the fuel-chamber in any convenient manner is an air-duct 5, said air-duct being curved from the front and is adapted to divide the fuel-chamber, which directs the

air as it is delivered above the fuel-bed down through the body of said fuel under the influence of the draft. The air-duct is curved to expose the rear flue to the operator from the front and is of the usual form, having spaced-apart tips 5<sup>a</sup> within the lower end to provide air-distributing means, a novel means being also employed to lock the shield 6 in position. The tips 5<sup>a</sup> have flanges 5<sup>b</sup>, which project beyond the edge of the air-duct, and on said flanges the shield 6 is seated. Secured to each side of the shield is a rearwardly-projecting hook-shaped lug 6<sup>a</sup>, engaging slots in the front wall of the air-duct. To remove the shield, it is given a slight lift, which raises the point of the hook up, so that when the shield is given a movement toward the front the hook will be drawn through the openings. Bolts, rivets, and the like are therefore dispensed with in so far as the fixing of the shield to the duct is concerned.

The fuel-chamber is composed of a front grate 7, perforated side lining 8, rear wall 9, formed of perforated hollow pendent bars 10, and bottom or grate 11. The sides 8 are preferably provided with vertical grooves and are set in from the wall of the casing 1 to form hot-air chambers 12, similar chambers being formed between the bars 10 and the rear wall of the casing. A hinged door 13 is located in front of the grate 7, and projecting through said door will be any suitable means for introducing to the lower part of the body of the fuel a supply of air, tubes 13<sup>a</sup> being shown in the drawings for this purpose.

The feed-door 14 has secured to or formed with it on the inner side an air-chamber or superheater 15, having projecting therefrom a series of hollow tubular-shaped protuberances 16, provided with tapered tubes 17. When the door is closed, the superheater registers with openings in air-heating chambers 18 on the inside of the casing 1, said chambers supplying the superheater with heated air. The exit of air from said superheater is controlled by a sliding damper 19, provided with an operating-handle 20. Unlike feed-doors used in stoves of this character, it preferably has no openings which communicate with the atmosphere. However, suitable



windows are provided adjacent the protuberances 16, so as to permit the operator to note the condition of the fire.

Located preferably at the rear of and near the top of the stove is an air-heating supply-chamber 25, divided into two compartments by a partition 26, each compartment having an opening 27, covered by a damper 28, the damper in both compartments being mounted on a single operating-rod. The purpose of the partition 26 is to prevent an uneven distribution of heated air to the fuel.

Near each end of the air-supply chamber 25 are two pipes 29 and 30, the former entering the air-duct to introduce a supply of heated air thereto, and the latter pipes enter the chambers 18 to supply the superheater 15 with air. Flues 12<sup>a</sup>, on the outside of the casing 1, communicate with the ends of the air-supply chamber 25 and the air-chambers 12, formed between the side linings 8 and the casing. Depending from a point near each end of the supply-chamber are pipes 31, which communicate with the space formed in the rear of the lining 9. Hence it will be seen that I furnish currents of heated air to several different points in the fuel-chamber from a single source, making it a decidedly easy matter for the operator to control the admission of air to regulate the combustion.

In rear of the stove are arranged a plurality of upwardly-extending auxiliary flues 34, 35, and 36, all of which communicate with a commingling-chamber 37. The middle flue 35 at its upper end is surrounded on three sides by a wall 38 and is capable of being entirely surrounded and closed by operating a damper 39, said damper having an operating connection and handle 40. The upper ends of the remaining auxiliary flues enter the upper rear main flue and are at all times in direct communication therewith.

In the practical operation of my invention I prefer to place the stove in a fireplace 40, covering the upper portion so as to just permit the passage of the stove-pipe 4.

When fuel is placed in the fuel-chamber, the damper 39 is positioned to permit of a direct communication between said fuel-chamber and the chimney. Likewise the dampers controlling the air introduced at the lower front part of the mass of fuel is opened, introducing a direct air-current through the fuel-chamber to the chimney. As the fire progresses and the fuel gradually becomes incandescent the incoming air at the bottom is regulated accordingly. So, also, are the dampers 28 in the air-supply chamber gradually opened to admit heated air, respectively, through the protuberances and pipes 17, the air-duct 5, the sides 8, and rear 9 of the fuel-chamber. These dampers being opened, the fuel soon becomes incandescent, at which stage the main damper 39 is raised, or, in other words, positioned to cut off the direct communication between the fuel-chamber and the chimney, necessitating the products of com-

bustion taking a long tortuous passage before escaping to the atmosphere. With the damper 39 so positioned the products of combustion are directed over the heated-air-supply chamber and divided, part going down, respectively, the flues 34 and 36, and again meet in the lower commingling-chamber 37, and are directed in this mixed condition up through the middle flue 35 to the chimney.

My purpose in setting the stove in a fireplace is to utilize as much as possible the heated air in the surrounding space. The space formed between the stove and the walls of the fireplace of necessity forms an air-heating chamber, and the air therein having a natural tendency to rise will enter the openings 27 in the air-supply chamber, from whence it is directed, as before stated. As the air enters the chamber 25 it encounters the intense heat therein, made possible by the products of combustion passing over the walls of the chamber to the chimney. Before the air reaches the point where it is intended to accomplish its mission it is again subjected to an intense heating-surface, in that in its passage it is continually taking up the heat in the various flues. The conduits or flues are all so arranged as to be in contact either directly or indirectly with the action of the intense heat in the fuel-chamber. This is especially true of the air delivered from the air-duct and the superheater on the feed-door.

It frequently happens when burning soft or bituminous coal that a regulated series of currents of air be given the lower part of the fuel, while the air admitted above the fuel must not equal that delivered below. This applies more particularly when the fuel-chamber is filled to be left for a great length of time, and for this purpose the damper 19 is provided. It is evident I may, if so desired, entirely cut off the supply of air at this point. However, as a rule it will be open.

The term "fuel-magazine" as used throughout this description and the claims is intended to refer to a fuel-magazine, as generally understood, or to a fire-pot.

Having thus described my invention, what I claim is—

1. A stove comprising a casing, a fuel-chamber, a main exit-flue, a series of tubes for introducing jets of air through the fuel under the influence of the draft, a plurality of auxiliary flues communicating with each other at one end, and at their opposite end with the main exit-flue, a damper in said flue to cut off the main exit-flue from the fuel-chamber to direct the products of combustion passing to the exit-flue through the plurality of auxiliary flues, an air-heating chamber interposed between the casing and the plurality of auxiliary flues, and flues connecting said chamber and the tubes as described.

2. A stove comprising a casing, a fuel-chamber, a main exit-flue, a series of tubes arranged to deliver jets of air below the bed of



the fuel, a plurality of auxiliary flues communicating with each other at one end, and at their opposite ends with the main exit-flue, a damper in said flue to cut off the main exit-flue from the combustion-chamber to direct the products of combustion passing to the exit-flue through the plurality of auxiliary flues, a hot-air-supply chamber in proximity to the main exit-flue and the plurality of auxiliary flues, and means connected to said hot-air chamber for supplying jets of heated air to the fuel-chamber, substantially as described.

3. A stove comprising a casing, a fuel-chamber, a main exit-flue, a plurality of auxiliary flues communicating with each other at one end, and at their opposite ends with the main exit-flue, a damper in said flue to cut off the main exit-flue from communication with the fuel-chamber to direct the products of combustion passing to the exit-flue through the plurality of auxiliary flues, a hot-air-supply chamber in proximity to the main exit-flue and the plurality of auxiliary flues, means connected to said hot-air chamber for supplying a series of currents of heated air to the fuel-chamber in various places, and means also connected to the air-heating chamber for delivering jets of heated air to the fuel substantially as set forth.

4. A stove comprising a casing, a fuel-chamber, a main exit-flue, a hot-air-supply chamber, a superheater having perforated protuberances within the fuel-chamber, a hot-air chamber communicating with said superheater, and flues connecting the hot-air-supply chamber and the hot-air chamber communicating with the superheater, substantially as described.

5. A stove comprising a casing, a fuel-chamber, a pendent air-duct, a main exit-flue, a hot-air-supply chamber, flues connecting the hot-air-supply chamber and the air-duct, a superheater having perforated protuberances within the fuel-chamber, a hot-air chamber communicating with said superheater, and flues connecting the hot-air-supply chamber and the hot-air chamber communicating with the superheater, substantially as described.

6. A stove comprising a casing, a fuel-chamber, a pendent air-duct, a main exit-flue, a hot-air-supply chamber, flues connecting the hot-air-supply chamber and the air-duct, perforated hollow linings in said fuel-chamber, flues connecting said hollow portions of said linings with the hot-air-supply chamber, a superheater having perforated protuberances within the fuel-chamber, a hot-air chamber communicating with said chamber, and flues connecting the hot-air-supply chamber and the hot-air chamber communicating with the superheater, substantially as described.

7. A stove comprising a casing, a fuel-chamber, having a hollow lining, a pendent partition, a main exit-flue, a superheater having perforated protuberances, a damper in said superheater a hot-air-supply chamber, a damper for regulating the admission of air thereto, and

pipes or flues leading from said chamber and communicating respectively with the air-duct, superheater and hollow lining, substantially as set forth.

8. A stove comprising a casing, a fuel-chamber, having a hollow lining, a pendent air-duct, provided with means for delivering currents of heated air to the fuel, a main exit-flue, a superheater having perforated protuberances, a hot-air-supply chamber located in the rear of the casing, and pipes or flues leading from said chamber and communicating respectively with the air-duct, superheater and hollow lining, a damper in the hot-air-supply chamber, and a damper in the superheater for independently controlling the air introduced through the perforated protuberances, substantially as set forth.

9. A stove comprising a casing, a fuel-chamber, a pendent air-duct, a main exit-flue, a plurality of auxiliary flues communicating with said exit-flue, a commingling-chamber at the bottom of said exit-flue with which said auxiliary flues communicate, a damper adapted to shut off direct communication between the central auxiliary flue and the main flue, to direct the products of combustion passing to the chimney to traverse the plurality of auxiliary flues, in combination with an air-heating chamber interposed between the casing and the flues and means cooperating therewith for delivering through the fuel-bed currents of heated air from the air-heating chamber, said air-currents being drawn through said fuel, under the influence of the draft.

10. A stove comprising a casing, a fuel-chamber, a pendent air-duct, a main exit-flue, a damper, means coacting with said damper whereby the products of combustion are deflected and separated and again brought together before said products of combustion leave the stove, in combination with an air-heating chamber interposed between the casing and the flues, and means cooperating therewith for delivering through the fuel-bed currents of heated air from the air-heating chamber, said air-currents being drawn through said fuel under the influence of the draft.

11. A stove comprising a casing, a fuel-chamber, having a perforated hollow lining, a pendent air-duct, a main exit-flue, superheater, perforated hollow protuberances, a damper in said superheater, an air-heating supply-chamber, pipes or flues connecting said chamber with the hollow lining, the superheater and the air-duct, a plurality of auxiliary flues communicating with said main flue, a commingling-chamber at the bottom of said auxiliary flues, and a damper for cutting off the central auxiliary flue from direct connection with the main flue, substantially as described.

12. A stove comprising a casing a fuel-magazine, an air-duct having openings in one of its walls, removable means in the lower end



of said duct for distributing air to the fuel-magazine, said air-distributing means having flanges projecting beyond the air-duct, a shield supported at its lower end by said  
5 flanges on the means for distributing air, and hook-shaped lugs projecting from said shield and adapted to engage the openings in the air-duct, whereby said shield is prevented from being laterally displaced, except by an  
10 upward movement of the same, substantially as described.

13. A stove, comprising a casing, a fuel-magazine, a curved air-duct, a curved flue in rear of the same, an air-heating chamber positioned to be heated as the products pass  
15 through said flue, and means communicating with said chamber for delivering currents of heated air to the fuel.

14. A stove comprising a casing, a fuel-  
20 magazine, a chamber above the fuel, an air-

duct, a flue in rear of the same for the escape of the products of combustion, said flue also connecting with the fuel-magazine, an air-heating chamber positioned to be heated as  
25 the products pass through said flue, and means communicating with said chamber for delivering two sets of currents of heated air to the fuel, one set of said currents of air being delivered to the air-chamber and thence  
30 to and through the fuel from the top, while the other set of air-currents are delivered to the air-duct and thence through the fuel from below the top.

In testimony whereof I have hereunto set my hand in the presence of two subscribing  
35 witnesses.

EDWIN R. CAHOONE.

Witnesses:

GEO. E. FRECH,

WALTER A. WILLIAMS.