

(No Model.)

3 Sheets—Sheet 1.

J. F. DONAHOE.
COMBINED GAS STOVE AND GRATE.

No. 567,226.

Patented Sept. 8, 1896.

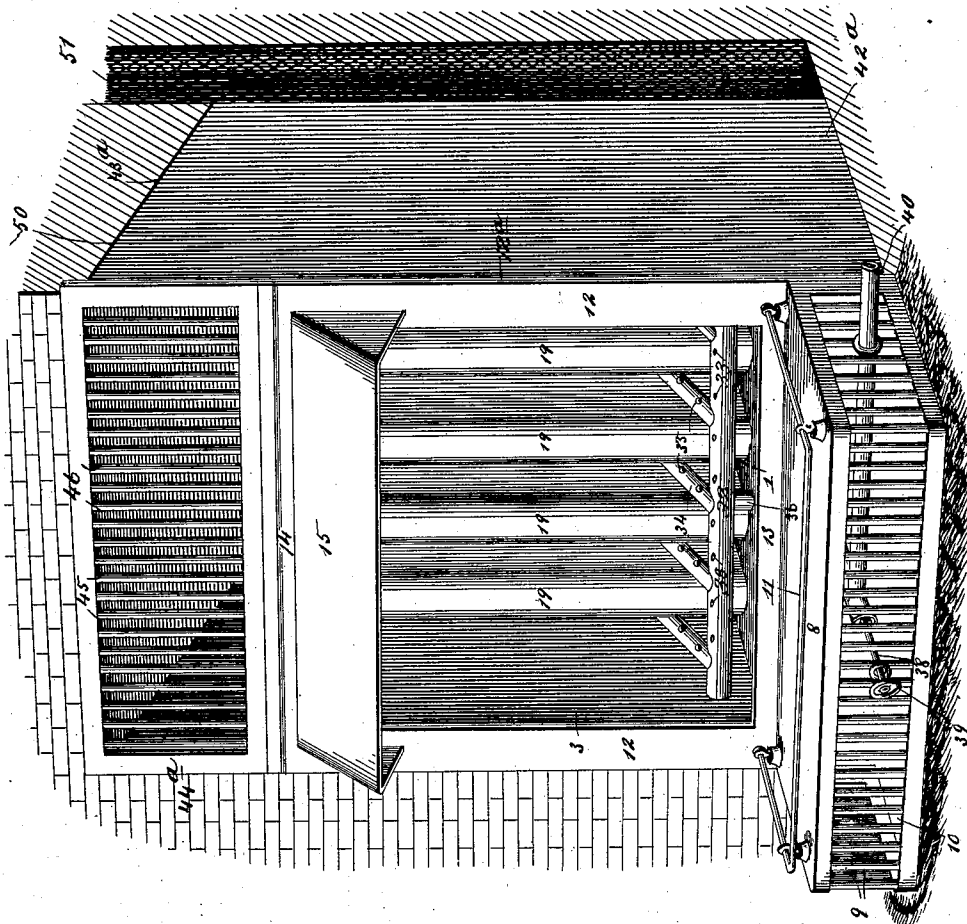


Fig. 1.

Witnesses:

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Inventor
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by Higdon & Higdon

Attys.

(No Model.)

3 Sheets—Sheet 2.

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Fig. 3.

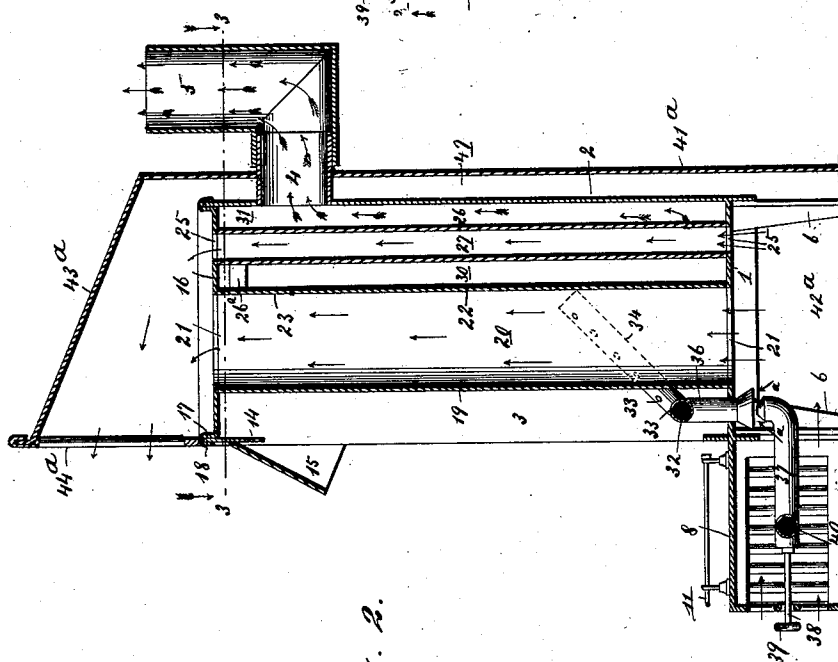
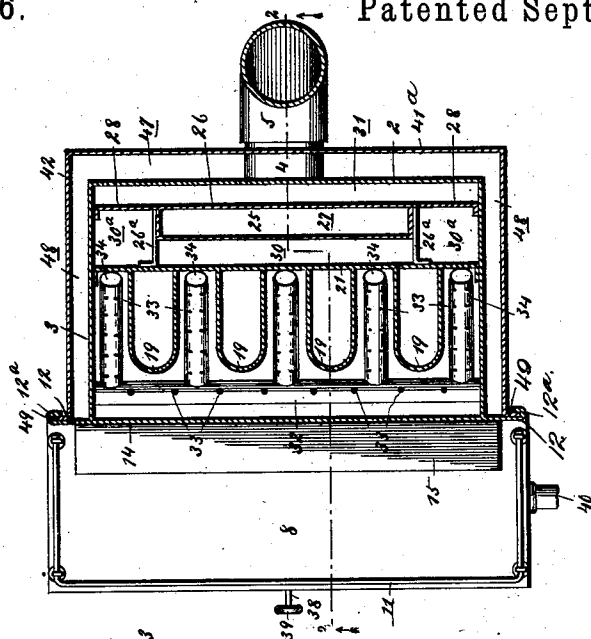


Fig. 2.

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Fig. 6.

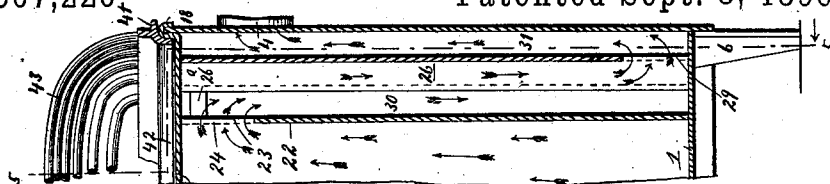


Fig. 5.

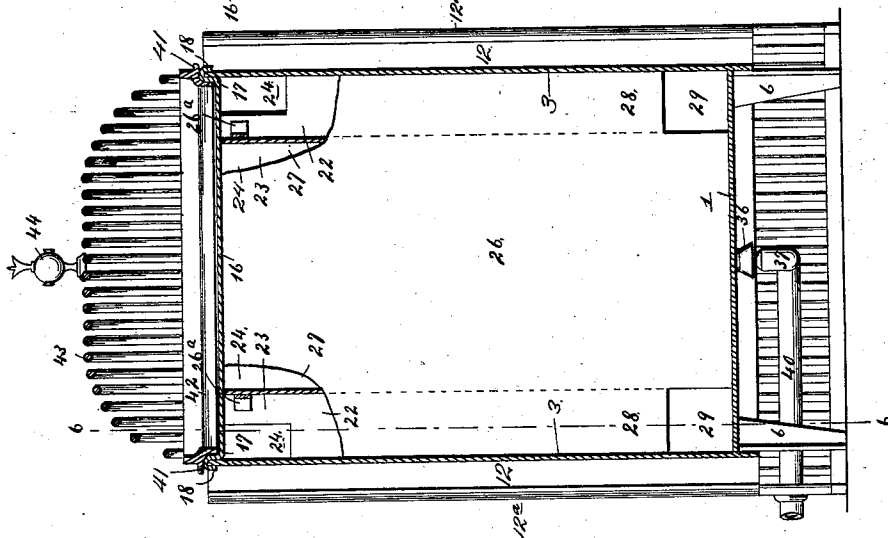
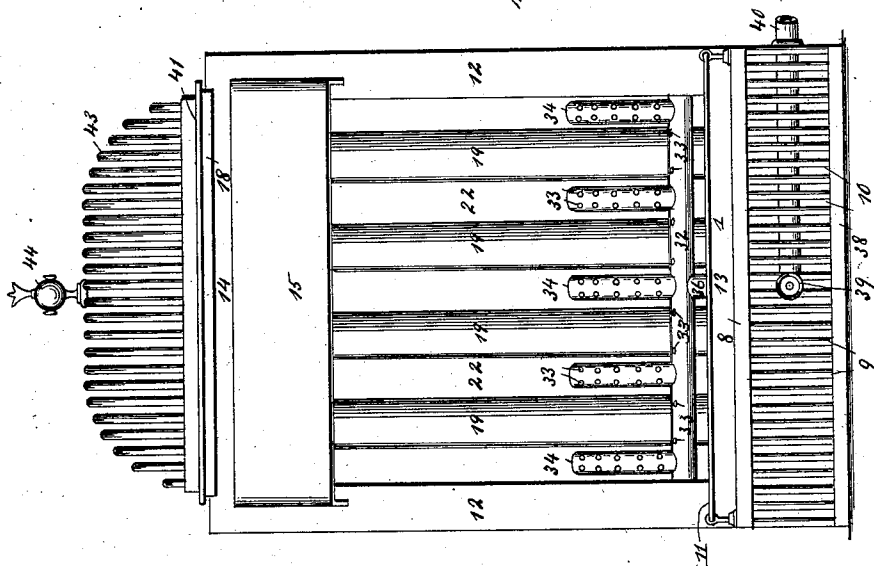


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN F. DONAHOE, OF PAOLA, KANSAS.

COMBINED GAS-STOVE AND GRATE.

SPECIFICATION forming part of Letters Patent No. 567,226, dated September 8, 1896.

Application filed May 8, 1895. Serial No. 548,546. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. DONAHOE, of Paola, Miami county, Kansas, have invented certain new and useful Improvements in a
5 Combined Gas-Stove and Grate, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to combined gas-stoves
10 and grates; and my object is to provide a structure whereby nearly all of the benefits of an open-front stove or grate may be obtained in point of convenience, cheerfulness, and comfort, and at the same time nearly the
15 entire heating-surface of the stove may be utilized to heat the air in the room and cause it to circulate.

Other objects of the invention will appear in the following description, and will be pointed
20 out in the appended claims.

In order that the invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

25 Figure 1 represents a perspective view of a structure embodying my invention arranged as a grate and located operatively relative to the flue through which the products of combustion pass off. Fig. 2 represents a vertical
30 section of the same, taken on the line 2 2 of Fig. 3. Fig. 3 represents a horizontal section taken on the line 3 3 of Fig. 2. Fig. 4 represents a front view of a structure embodying my invention arranged as a gas-stove. Fig. 5
35 represents a vertical section of the same, taken on the line 5 5 of Fig. 6 and partly broken away at its upper corners. Fig. 6 represents a vertical section taken on the line 6 6 of Fig. 5.

40 Referring to the drawings, where similar numerals designate corresponding parts, 1 designates the bottom plate of the structure, and projecting vertically upward from the rear and side margins of the same are the
45 back plate 2 and the side plates 3. The back plate 2, near its upper end and midway between its sides, is provided with an opening, with which communicates the rearwardly-projecting combustion-pipe 4, to which the
50 usual stovepipe 5, leading to the chimney, is attached. The stove is supported at each corner by the depending legs 6 of the con-

struction shown or of any other suitable or preferred construction.

Projecting forward from and preferably integral with the bottom 1 is the hearth 8. This
55 hearth is preferably in the form of a casting, which at its lower end rests upon the floor. This hearth must be open to permit air to pass freely through it to provide for the free
60 circulation of air and for the supply of the same to the mixing-chamber of the burner, hereinafter more particularly referred to. I have shown it as formed of a series of alternating bars 9 and spaces 10, but it is to be
65 understood that it may be of any ornamental configuration desired, provided that it is sufficiently open to permit air to pass freely therethrough. The hearth is provided with the usual fender 11 near its margins. The
70 front plate of the structure is formed with an enlarged opening, so as to form practically the outwardly-projecting flanges 12 at its side margins, the upwardly-projecting flange 13 at the junction of the hearth with
75 the bottom, and the depending flange 14, connecting the side flanges 12 at their upper ends. The front plate also carries an overhanging hood or deflector 15, which tends to confine the products of combustion and direct them on their proper course within the
80 structure. The top 16 of the structure is bent upward near its margin, as shown at 17, and then curved outward and downward to form the downwardly-disposed hooks 18,
85 which snugly yet detachably embrace the upper ends of the back and side plates and the front plate, as shown most clearly in Figs. 2 and 5. Extending vertically within the structure from the bottom plate to the top
90 plate are the tubes 19, which thus form vertical air-passages 20, communicating at their upper and lower ends with openings 21 in the said bottom and top plates. The body portions of these tubes are preferably of U
95 form, and their back wall, from the bottom plate up to within a short distance of the top plate, comprises a single vertical plate 22, which extends from side wall to side wall. A short plate 23 is employed to continue the
100 back wall of each of said tubes, and as said short plates are entirely independent of each other and correspond in width to the said tubes a number of apertures 24 are formed

between the upper end of the plate 22 and the top plate 16, between each pair of tubes 19, and between the end tubes 19 and the side plates of the structure, as illustrated most clearly in Figs. 5 and 6.

Rearward of the apertures or openings 21, which communicate with the passages 20, the top plate 16 and the bottom plate 1 are provided with registering elongated apertures 25. These apertures are connected by a vertical tube 26, so as to form the vertical passage 27, which opens at its opposite ends below the bottom plate and above the top plate of the structure, as shown most clearly in Fig. 2. The back plate of the tube 26 is extended outwardly to the side plates 3, as shown at 28, (see Figs. 3 and 5,) and near its lower corners is cut away to form the apertures 29. The arrangement of the vertical tube 26, as shown, provides a vertical passage 30 between said tube and the back plate 22 of the tubes 19, and said passage 30 is enlarged at each side of said tube 26, as shown at 30^a. The passage 30, with its enlargements 30^a, communicates with the space in front of the back plate 22 and external of the tubes 19 through the apertures 24, hereinbefore referred to, and said enlargements 30^a also communicate through the passages 29 with the lower end of a vertical passage 31, formed between the back plate of the tube 26 and the back plate proper, 2, of the structure. The upper and lower ends of this passage being closed, as shown most clearly in Figs. 2, 5, and 6, compels the products of combustion, as traced by the flight of arrows, to escape by way of the pipe 4 and the pipe 5 to the chimney. The upper end and the lower end of the passage 30 and its enlargements 30^a are also closed by the top plate 16 and the bottom plate 1, as shown clearly in the figures above specified, and the products of combustion are compelled to take the course indicated by the flight of arrows, Fig. 6. Arranged contiguous to the front side and lower ends of the tubes 19 is the transversely-extending pipe 32, provided with numerous burner openings or orifices 33, and provided also with branch pipes 34, which are also provided with burner openings or orifices 33. These branch pipes are arranged between the said tubes 19 and the side plates of the structure and extend upwardly and inwardly from the pipe 32 at about an angle of forty-five degrees. Communicating centrally, preferably, with the burner-pipe 32 is the pipe 36, which terminates at its lower end in a flaring mixing-chamber wherein the gas discharged from the pipe 37 mingles with sufficient air to support combustion. This burner construction is of the ordinary "Bunsen" type, and forms no part of my invention. Therefore I deem it unnecessary to describe and illustrate its detail construction.

The pipe 37 is controlled by an ordinary needle-valve, (not shown,) and the stem of the same projects beyond the hearth and is pro-

vided with the usual hand-wheel 39, by which the amount of gas fed to the burner is regulated. The pipe 37, controlled by said valve, is supplied from a meter or other source of supply by way of the pipe 40, or in any other suitable or preferred manner, or said pipe may be connected directly to a gas-jet by a flexible tube, (not shown,) if desired. The structure thus described, if provided with an ornamental top of open-work construction, as shown upon Sheet 3 of the drawings, will form a stove, which may be placed at any required point in the room and connected with the chimney by stovepipes in the usual manner. The said removable top is preferably in the form of a casting comprising an annular base portion, corresponding in contour with the top plate of the structure and formed with an outwardly-projecting flange 41 to rest upon the downwardly-disposed hooks 18 of the top plate, and the depending flanges 42 to fit snugly against the vertical portions 17 of said top plate to prevent lateral displacement, the curved and ornamentally-contoured bars 43, which are arranged a slight distance apart to permit the air to pass freely between them, and the ornamental vase or figure 44^a, projecting centrally upward from the said portion composed of the bars 43.

The burner is preferably covered throughout with asbestos or equivalent material, so that in operation a warm and cheerful glow will be apparent without the objectionable glare of the bright flame produced by the burning of gas. This, however, does not form a part of my invention and is not essential to its successful operation. To illustrate the burner more clearly, the asbestos covering is omitted.

In operation the products of combustion from the burner pass upward externally of the tubes 19 and are caused by the action of the draft and the deflector or hood 15 to pass rearwardly through the apertures or openings 24, hereinbefore referred to, into the upper end of the passage 30 and the enlargements 30^a thereof. Said products of combustion then pass vertically downward and into the passage 31 by way of the apertures 29, and, rising in said passage, escape by way of the pipes 4 and 5, as hereinbefore explained. Thus it will be seen that the heat and products of combustion must take a tortuous course to escape, and in so doing are held in contact for a considerable length of time with the air-tubes 19 and 27, in fact entirely surround said air-tubes, and also come in contact with the side plates and back plate of the stove, so that the entire surface of the stove serves as a heat-radiator, and the air within the tubes 19 and 26, quickly becoming heated, rises in the direction indicated by the flight of featherless arrows, Fig. 2, and escapes through the open-work cap or cover above the top plate 16 and radiates throughout the room. The hot air thus continually radiating is continuously replaced by cold air,

so that a constant and complete circulation of air within the room is maintained while the stove is in service.

With all of the gas-stoves with which I am familiar at present in use the products of combustion are either discharged into the room or the greater part of the heat generated is conveyed away through the combustion-flues. The ornamental cover upon the stove is shown as formed of alternating bars and spaces to correspond with the construction of the hearth, but it is to be understood, like the hearth, that it may be of any suitable or preferred open-work construction.

When the structure above described, the cover being omitted, is to be employed as a grate, it is inclosed at all sides except the front by a casing of corresponding configuration. This casing comprises the back wall 41^a, the side walls 42^a, the upper margins of which incline upwardly and forwardly, preferably, from said back wall, the top wall 43^a, which inclines with the upper margins of and connects said side walls with the back wall, and an open-work front plate 44^a. This open-work front plate preferably fits snugly down upon the upper side of the downwardly-disposed hooks 18 of the top plate 16, as shown clearly in Figs. 1 and 2. In this case also the front plate 44^a of open-work construction is shown as of alternating bars 45 and spaces 46, and may also be of any other suitable or preferred open-work construction. The said casing is of such size that an air-space 47 is formed between the back plate 2 of the structure and the back wall 41^a of the casing, and that air-spaces 48 are provided between its side walls 42^a and the side plates of said structure, so as to provide additional passages wherein the air may be heated by the external surface of the inclosed structure hereinbefore described. The air heated in such passages circulates with that passing through the tubes 19 and 26 through the room by way of the open-work face-plate 44^a, as will be understood. The back wall 41^a of said casing of course is provided with an opening, through which the combustion-pipe 4 projects. To secure said inclosed structure and said casing in operative position relative to each other firmly yet detachably, the outer margins of the flanges 12 of the face-plate are bent to form the inwardly-disposed hooks 12^a, which slidably engage the laterally-projecting flanges 49, formed at the front ends of the side walls 42^a of said casing, as shown most

clearly in Fig. 3. When said grate is placed in operative position, the casing fits snugly within the grate-opening 50 of the flue or chimney, and the short pipe or elbow 5 projects vertically upward into the flue 51, though, as will be understood, said short pipe or elbow may be dispensed with. The action of the grate is the same as that previously described the products of combustion passing up through the flue or chimney and the heated pure air of the room keeping up a continuous circulation.

It is to be understood that slight changes in the form, proportion, and arrangement of the parts may be resorted to without departing from the essential spirit and scope or sacrificing any of the advantages of my invention.

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

1. In a combined gas-stove and grate, the combination of top and bottom plates provided with a series of registering apertures, side plates and a back plate connecting the top and bottom plates, a series of independent air-tubes connecting the top and bottom plates and registering with the apertures thereof, a plate 22, connecting the rear margins of said tubes and extending from side plate to side plate and from the bottom upward to within a short distance of the top plate to form openings and passages between the sides of the said air-tubes, and a burner above the bottom plate and provided with branches which project into the passages between the air-tubes, substantially as shown and described.

2. In a combined gas-stove and grate, top and bottom plates, side plates and back plates connected together as shown, and supported upon legs above the floor, air-tubes passing through the top and bottom plates, a burner, an open-front casing surrounding the structure and extending down to the floor and over the top plate, and a combustion-pipe extending through registering apertures in the back of the casing and the back of the stove structure proper, substantially as shown and described.

In testimony whereof I affix my signature in the presence of two witnesses.

JOHN F. DONAHOE.

Witnesses:

J. W. SPANABLE,
WM. CROWELL.