(No Model.)

W. A. GREENE.

5 Sheets—Sheet 1.

COOKING STOVE.

No. 271,626. Patented Feb. 6, 1883.

Fig. 1.

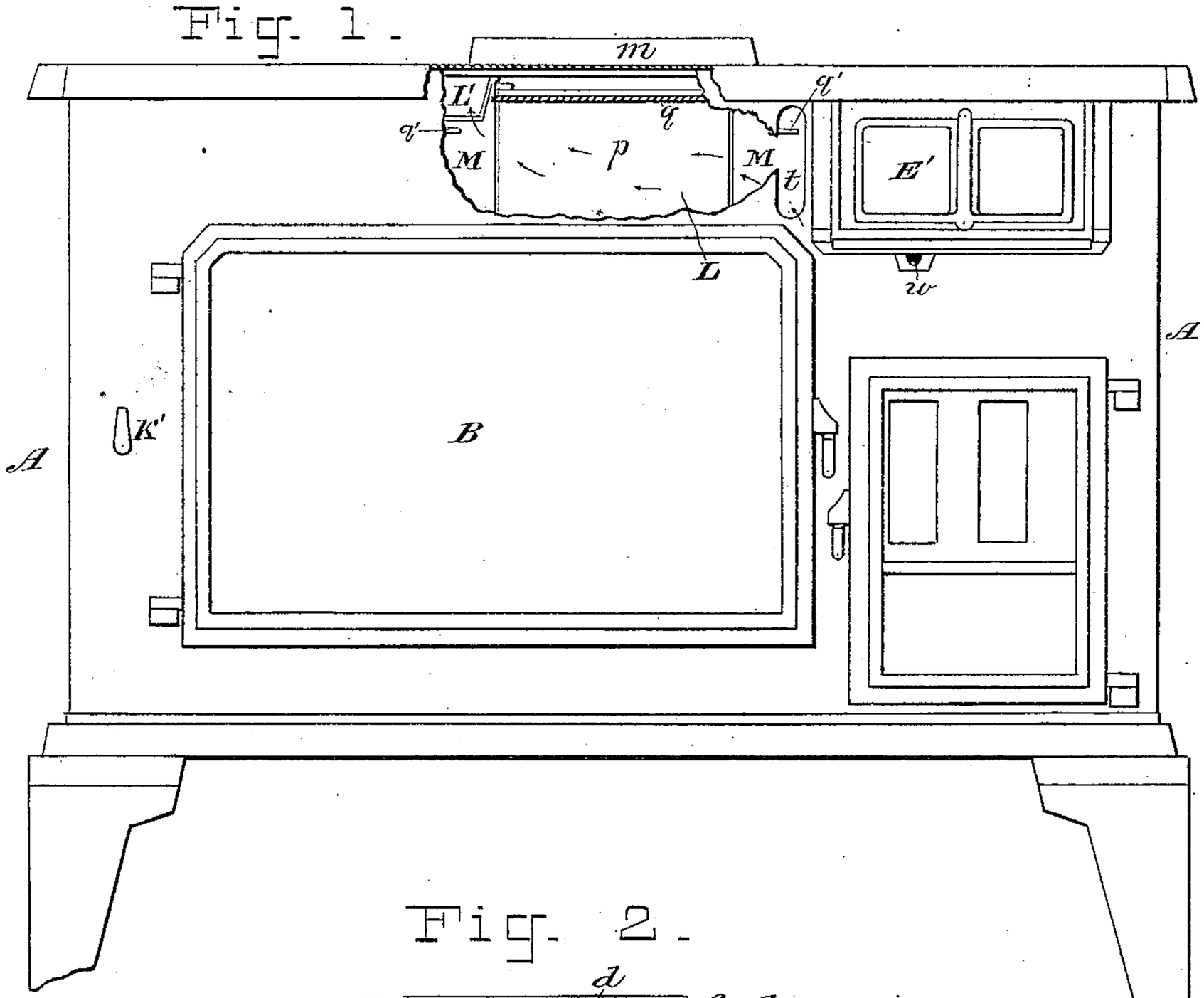
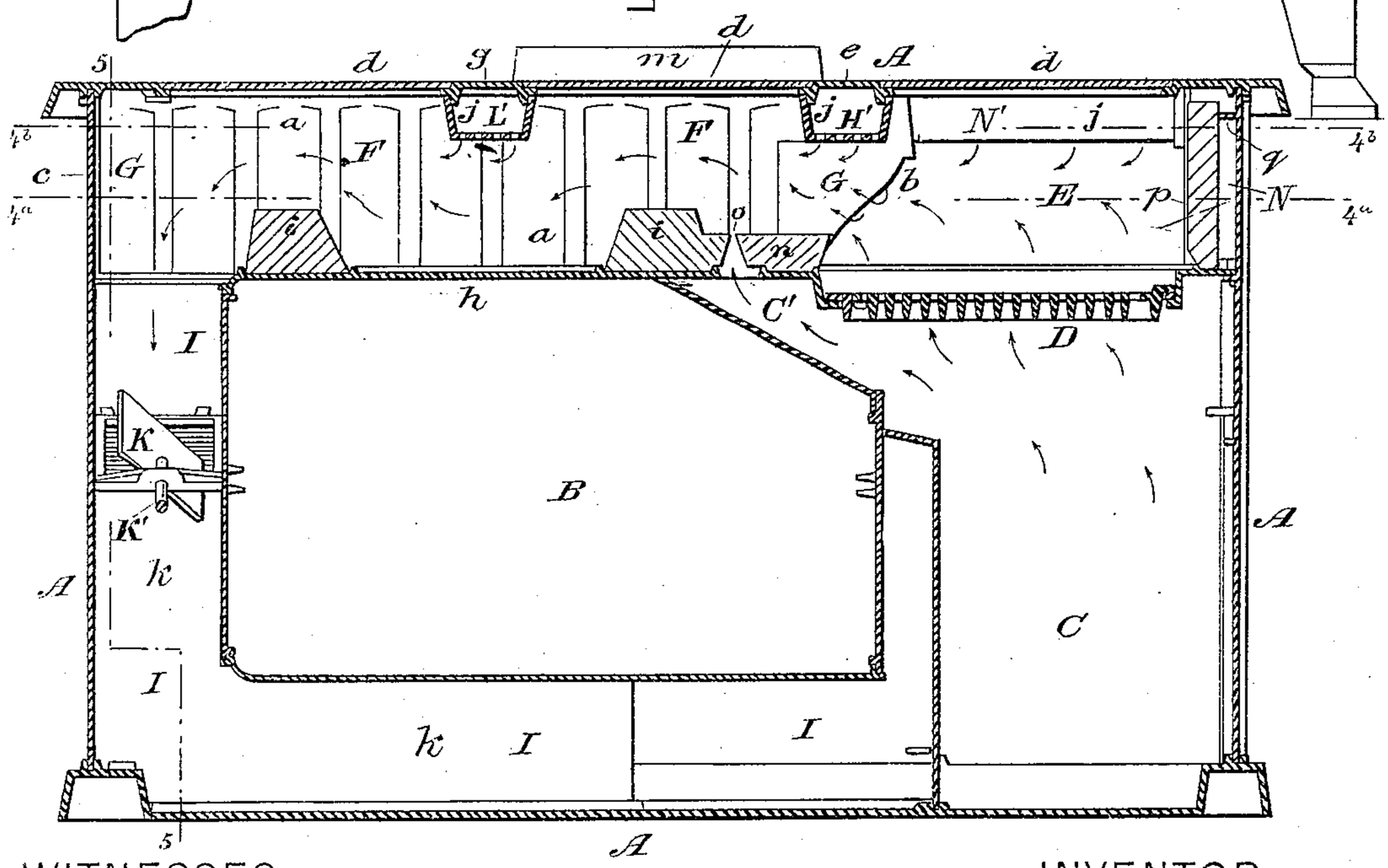


Fig. 2.



WITNESSES:

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Geo. H. Fraser

INVENTOR:

William A. Greene,

By his Attorneys,

Burke, Fraser & Bennett

(No Model.)

5 Sheets—Sheet 2.

W. A. GREENE.

COOKING STOVE.

No. 271,626. Patented Feb. 6, 1883.

Fig. 3.

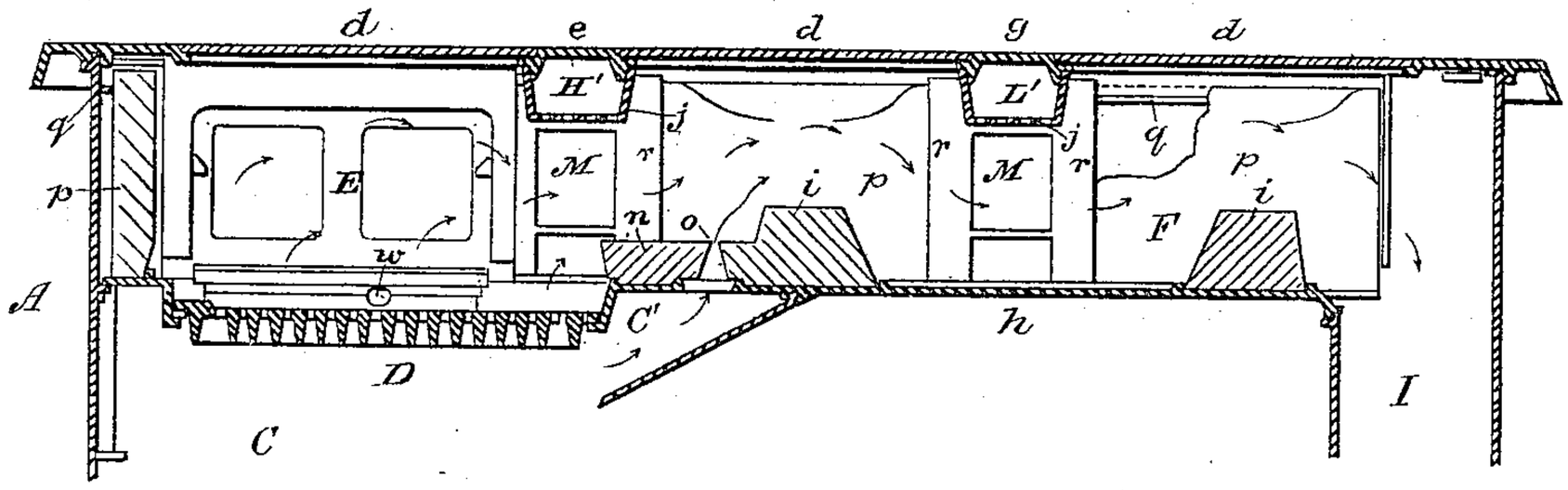
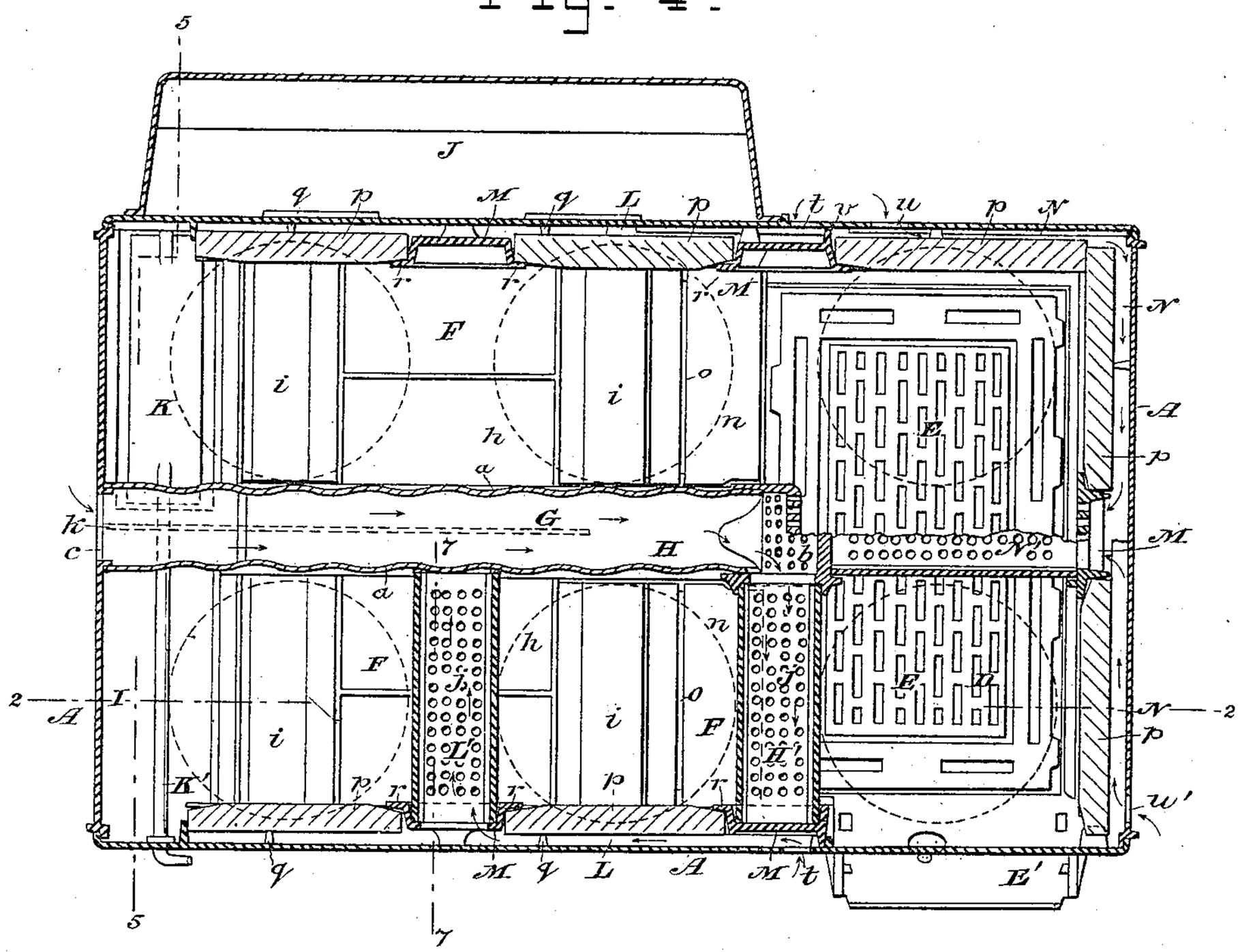


Fig. 4.



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(No Model.) 5 Sheets—Sheet 3.

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COOKING STOVE.

No. 271,626. Patented Feb. 6, 1883.

Fig. 5.

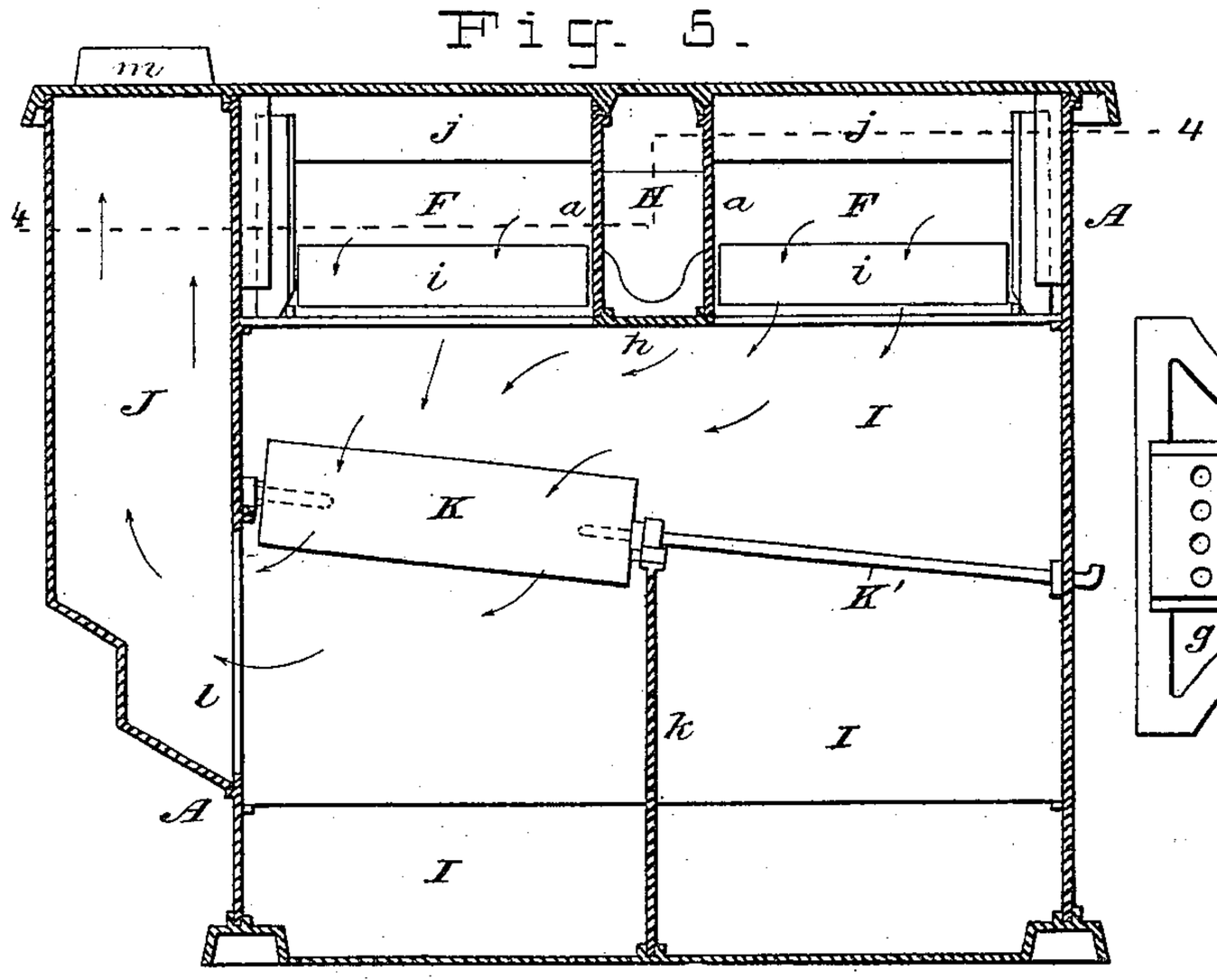


Fig. 6.

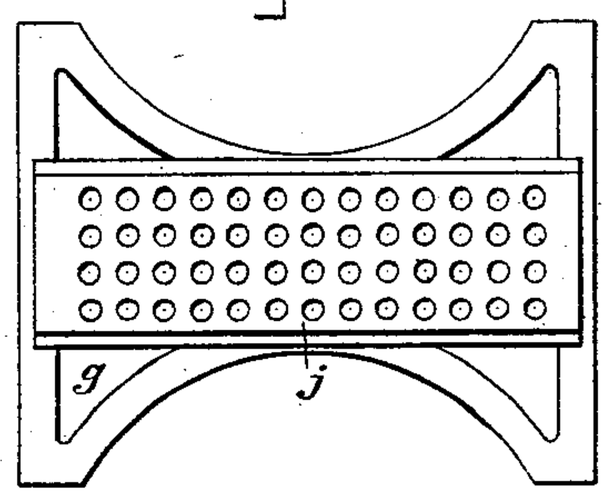
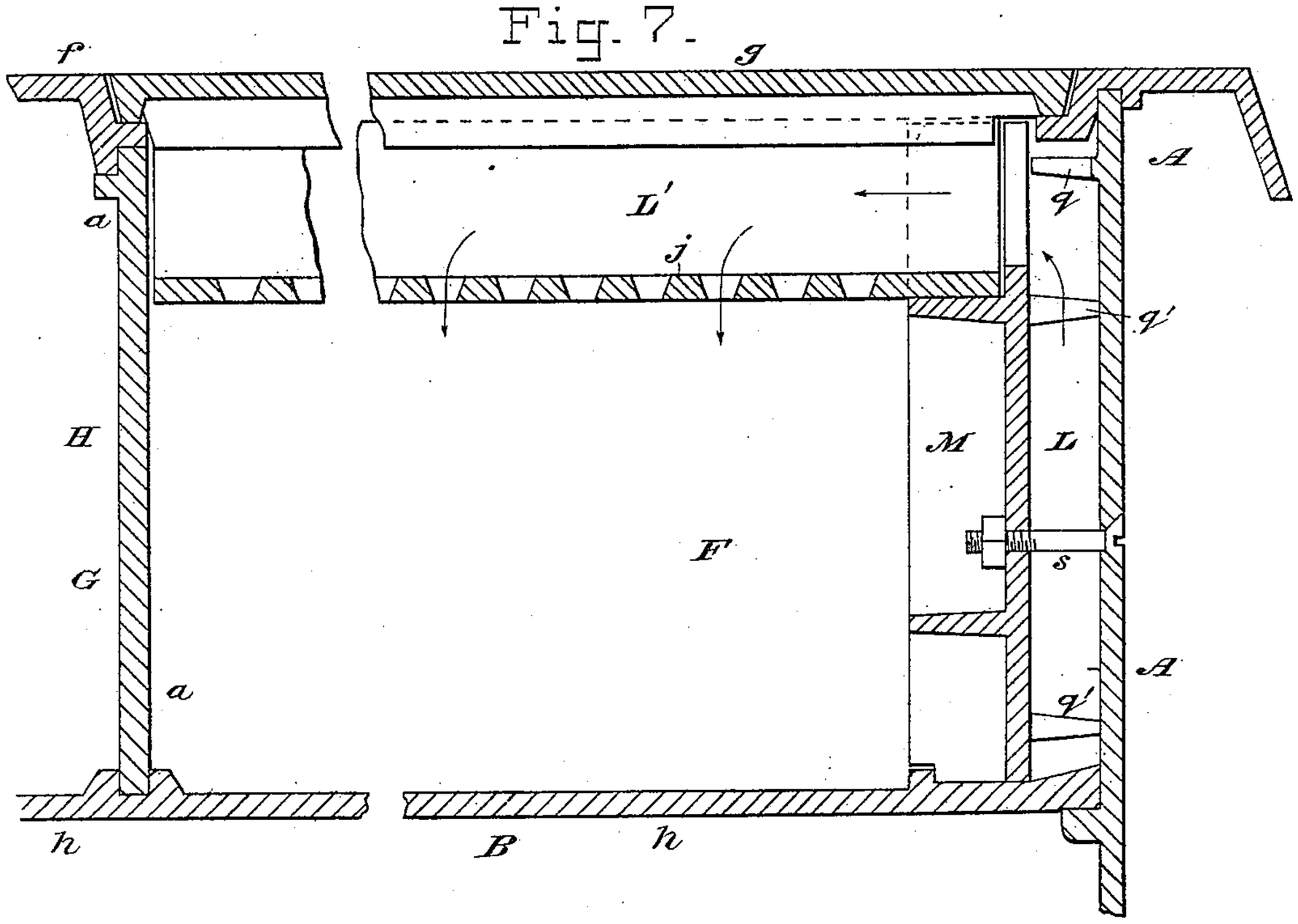


Fig. 7.



WITNESSES:

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(No Model.) 5 Sheets—Sheet 4.

W. A. GREENE.

COOKING STOVE.

No. 271,626. Patented Feb. 6, 1883.

Fig. 8.

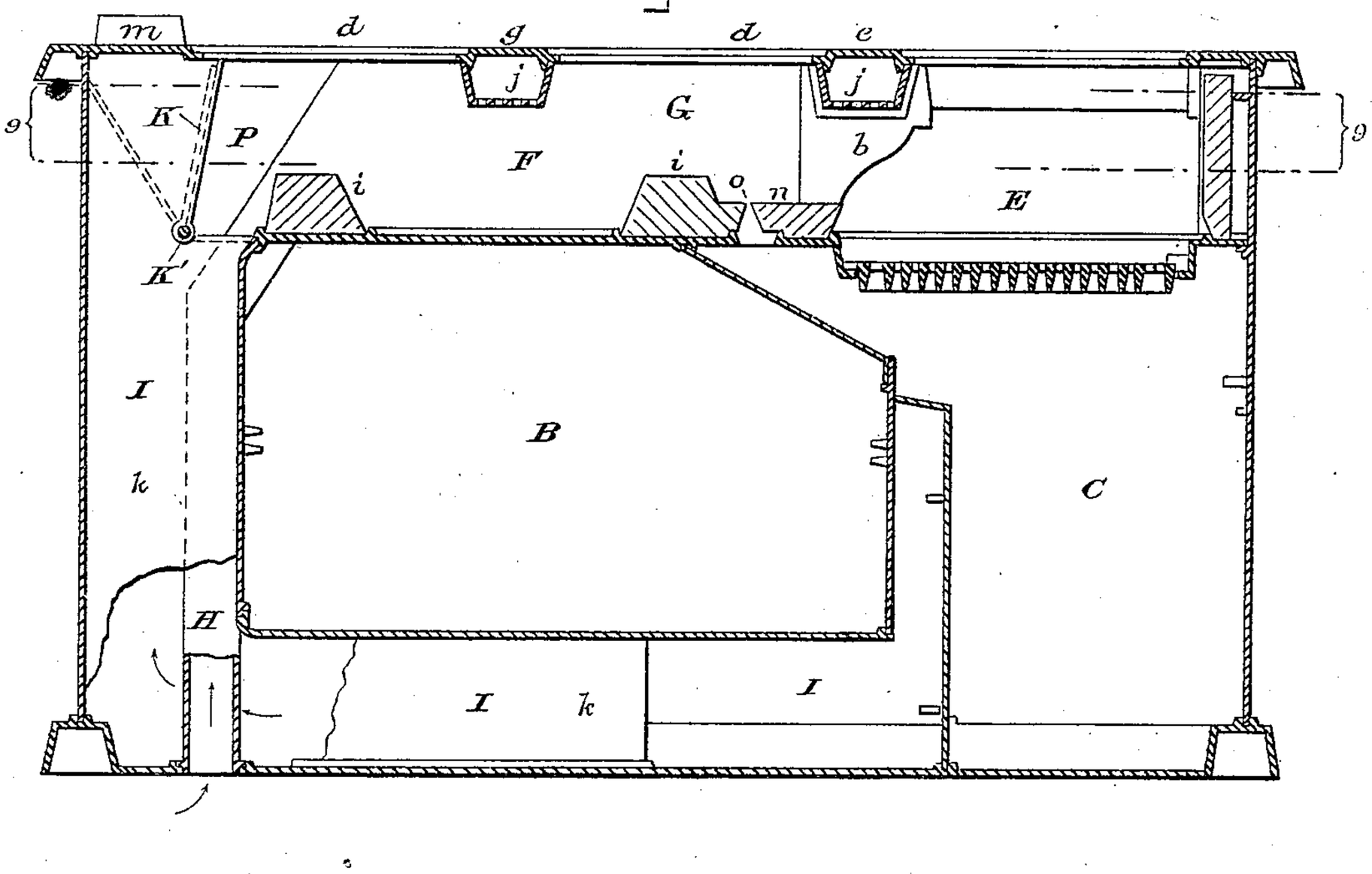
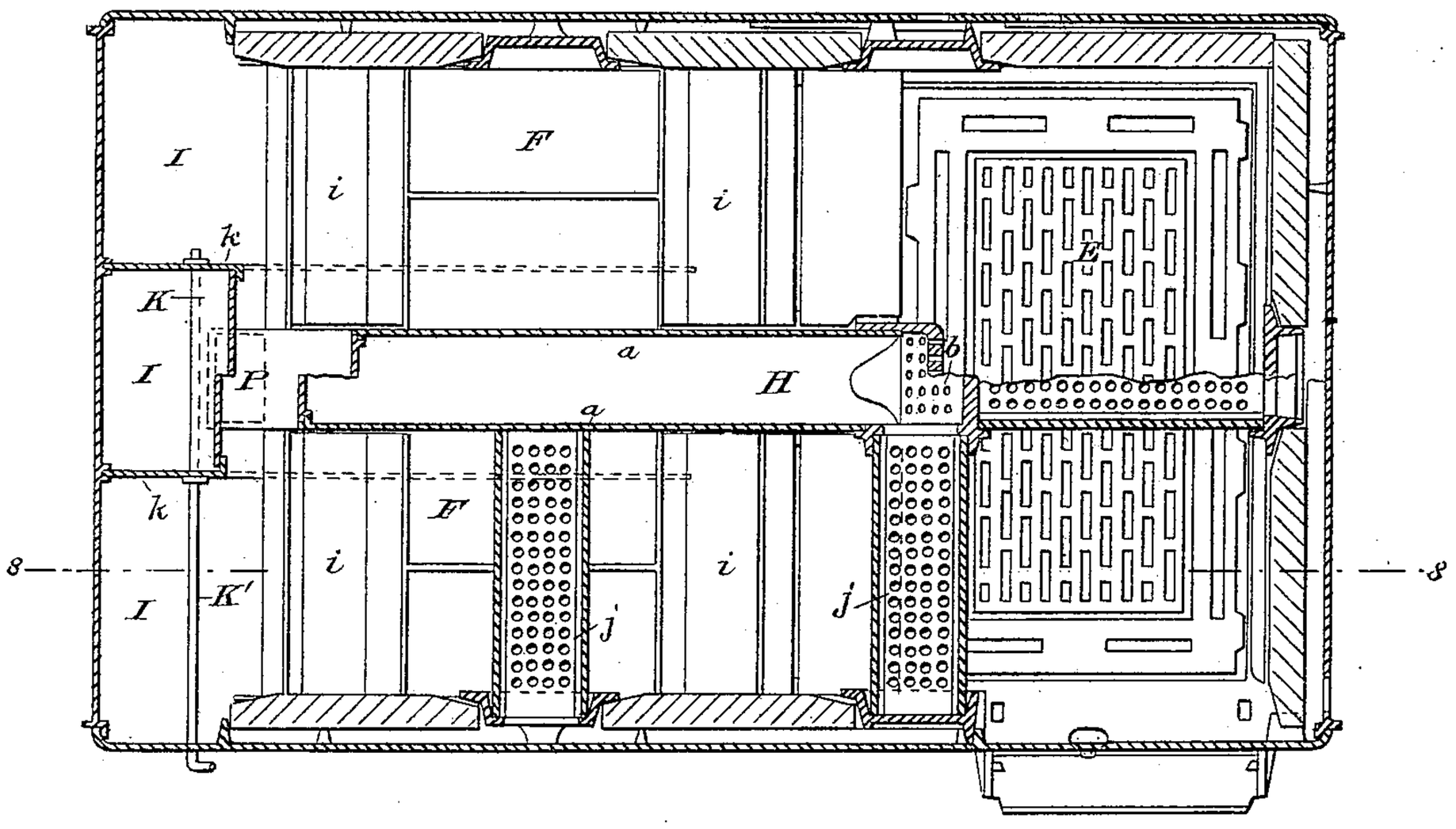


Fig. 9.



WITNESSES:

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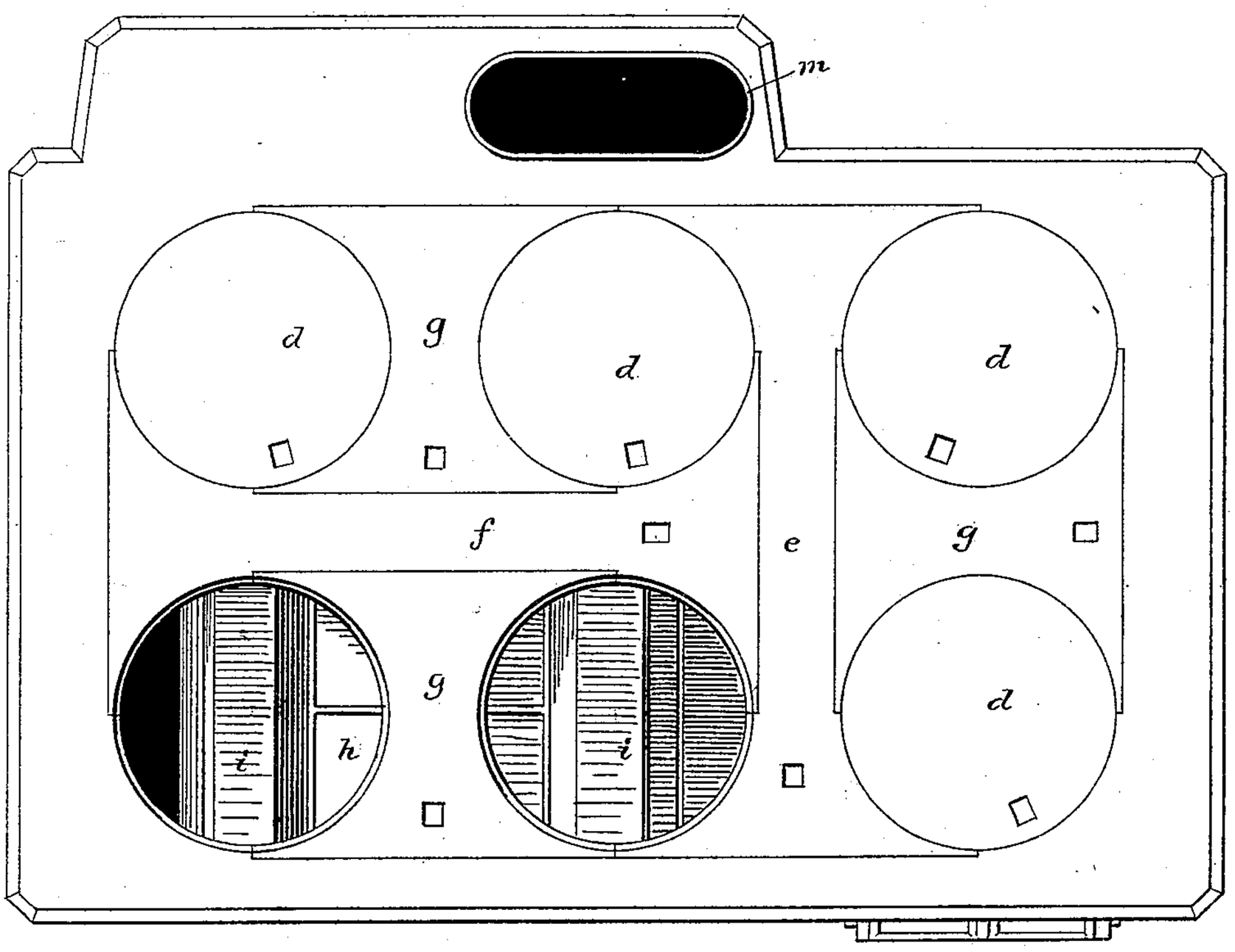
(No Model.) 5 Sheets—Sheet 5.

W. A. GREENE.

COOKING STOVE.

No. 271,626. Patented Feb. 6, 1883.

Fig. 10.



WITNESSES:

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INVENTOR:

William A. Greene

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UNITED STATES PATENT OFFICE.

WILLIAM A. GREENE, OF BROOKLYN, NEW YORK.

COOKING-STOVE.

SPECIFICATION forming part of Letters Patent No. 271,626, dated February 6, 1883.

Application filed August 31, 1882. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. GREENE, a resident of Brooklyn, in the county of Kings and State of New York, have invented certain Improvements in Cooking-Stoves, and in Stoves for other Purposes, of which the following is a specification.

The object of my invention is to provide a stove or range for burning soft or bituminous coal in a convenient, cleanly, and economical manner. Bituminous fuels afford a high degree of heat when so burned that all or a high percentage of their combustible constituents are utilized; but as ordinarily burned a large proportion of the fuel passes off in the form of smoke and unconsumed hydrocarbon gases, thereby vitiating the atmosphere, filling the chimneys and flues with soot, and wasting considerable fuel. Many smoke-preventing stoves have been designed, working on various principles; but all have either failed in their primary object or been too expensive, troublesome, complicated, or inconvenient to be successful in the hands of those who usually have charge of such stoves. I have aimed in my present invention to accomplish a thorough consumption of the fuel, and consequent avoidance of smoke, by means which it is beyond the power of the operative to derange by bad management, and to render the stove as simple in construction and as easy to operate as are the anthracite-stoves now commonly used.

Figure 1 of the accompanying drawings is a front elevation of my improved stove in its preferred form, partly broken away to show the construction. Fig. 2 is a vertical section thereof, cut in the plane of the lines 2 2 in Fig. 4, and viewed from the front. Fig. 3 is a similar section of the upper part of the stove, cut in the same plane, but viewed from the rear. Fig. 4 is a horizontal section cut in two different planes, as indicated by the dotted line 4 4 in Fig. 5, the rear half of the stove being cut in the plane of the line 4^a 4^a in Fig. 2, and the front half being cut in the plane of the line 4^b 4^b in Fig. 2. Fig. 5 is a vertical section, looking from the left-hand end, and cut in the plane of the lines 5 5 in Figs. 2 and 4. Fig. 6 is a detailed view. Fig. 7 is an enlarged fragmentary section cut in the plane of the line 7 7 in Fig. 4. Fig. 8 is a vertical section similar to Fig. 2, but showing a modified construction. Fig. 9 is a horizontal section thereof, cut in the same planes as Fig. 4; and Fig. 10 is a plan of the stove shown in Figs. 1 to 7.

I will first describe the construction shown in Figs. 1 to 7.

Let A designate the outer shell or casing; B, the oven; C, the ash-pit; D, the grate or fuel-bed; E, the fuel-chamber, and F F the gas-combustion chambers.

The general construction and arrangement of the oven, ash-pit, grate, and fuel-chamber are much the same as heretofore commonly employed in cook-stoves. The fuel-chamber is of less than the usual depth, and the gas-combustion chambers or flame-passages F F extend from it directly over the oven to the flues, their bottoms or floors being nearly on the same level as the grate. The chambers F F are separated by a central longitudinal dividing-wall, G, which is hollow for its entire length, being made of two vertical plates, *a a*, preferably corrugated, as shown in Fig. 4, and it extends from the left-hand end of the stove to the chamber E, over the grate, where it stops, being terminated by a curved perforated end plate, *b*. (Seen in Figs. 2 and 4.) The shell A, at the left-hand end of the stove, is formed with an aperture, *c*, opposite the end of the hollow partition G, thereby rendering the latter an air-flue, which I shall refer to as the flue H.

The stove is shown as formed with six stove-holes, *d d*, having the usual covers fitting between the usual short and long crosses. There are two long crosses, *e* and *f*, the former extending across the stove, or from front to rear, between the center and right-hand pair of holes *d d*, and the latter extending longitudinally of the stove from its left-hand end to the long cross *e*, on which it rests. These long crosses are both fixed in place, so that the cook cannot remove them, the cross *f* forming the top of the flue H. There are also three short crosses, *g g*, one over each chamber F, between the left-hand and middle holes *d*, and the third over the chamber E, between the front and rear right-hand holes.

The bottom or floor of each chamber F is formed by the plate *h*, which forms also the roof of the oven and the bottom of the flue H.

Thus the chambers F F have an imperforate floor or hearth, and on this are placed baffle-bricks *i i*, one directly beneath each hole *d*, and each extending back transversely across the chamber and projecting up about one-third the height thereof. Between each two holes *d d* the upper part of the chambers is similarly obstructed by an air-bridge, *j*, which is a hollow plate or casting of trough shape, fastened to the under side of one of the crosses *g* or *e*, and so extending transversely of the chamber. The effect of these obstructions arranged thus alternately above and below is to cause the products of combustion to take a sinuous course through the chambers, as indicated by the arrows in Fig. 2, thereby retarding their passage, causing them to give up a greater portion of heat proportioned to their retardment, and deflecting them upwardly against the stove-holes, thus accelerating cooking over the holes, and causing them to mingle with air entering through the air-bridges *j j*, as will be presently described.

From the left-hand end of the two chambers F F the draft-flue I leads down to the bottom of the stove, and to the right beneath the oven. Both chambers communicate with this flue, which in its downward passage contracts to one-half the depth of the shell, and extends along the front of a vertical partition, *k*, Fig. 5, until beneath the oven, when it extends back and up the rear side of this partition, as usual, whence it communicates through an aperture, *l*, with an outside flue, J, from which leads the collar *m*, which connects with the stove-pipe.

From the top of the partition *k* a valve, K, extends to the rear wall of the stove, and in ordinary burning this valve is closed, compelling the gases to pass through the flue I around the oven; but when a direct draft is required, as when kindling the fire, it is opened by its stem K′, which extends through to the front of the stove, whereupon the gases pass through its seat directly to the aperture *l* and into the flue J. The partition G serves in either position of the valve K to compel the stream of burning gases to pass beneath all the stove-holes, instead of flowing in a direct line toward the front or rear left-hand corner of the stove, whichever passage would afford them the more direct escape, as they would do were the partitions omitted. Thus the front and rear stove-holes cook alike whether the valve K be open or closed.

I provide means for supplying to the burning gases and products of combustion at successive points in their travel a considerable quantity of highly-heated air, in order that the smoke and carbonaceous products shall be thoroughly oxidized or consumed.

To the right of the right-hand baffle-brick, *i*, in each chamber is another and lower brick, *n*, whose edge nearly meets that of the brick *i*, leaving a narrow crack or slit between the two. Beneath this slit is an aperture in the plate *h*, and beneath this is a chamber, C′, over the oven, and forming an extension of the ash-pit. The bottom of this chamber has a sloping floor, so inclined that any ashes that may fall through the slit *o* will slide into the ash-pit. Air from the ash-pit ascends through the chamber C′ and slit *o*, becomes thereby highly heated by contact with the hot bricks *i n*, and enters the chamber F just in advance of the elevated portion of the brick *i*, so that in passing over that brick the current of burning gases is brought into contact with the stream of air. At this point the chamber F is slightly separated from the chamber E by a contraction or throat, formed by the brick *n* below and the air-bridge *j* above, thereby slightly impeding the passage of gases from the chamber E and insuring their mingling with the air admitted through bridge *j* and slit *o*. The interiors of the two bridges *j j* forming these throats communicate by openings through the plates *a a* with the flue H, as shown in Fig. 4, and constitute branch flues H′ H′. Their ends at the front and back walls of the stove are closed. Air enters at the aperture *c*, flows through flue H, thereby becoming heated by contact with the plates *a a*, and serving also to cool these plates and prevent their destruction, and on arriving at the end of this flue divides and flows in opposite directions into the flues H′ H′, whence it enters the chambers F F through numerous perforations in the bottom of the bridges *j j*. Air also enters from flue H into the chamber E through perforations in the end plate, *b*. The left-hand bridges, *j*, crossing the middle of the two chambers F, do not communicate with the flue H, but with flues L L, close to the front and rear walls A of the stove, their interiors forming flues L′ L′. These flues L L are formed by keeping the fire-bricks or tiles *p p*, lining the outer side of the chambers F F, out of contact with the walls A A, so as to leave an air-space between the two, as best shown in Fig. 4. This is accomplished by forming the wall A with flanges, spurs, or other projections *q q*, against which the backs of the tiles *p p* may rest. The tiles are held back against these projections by plates M M, one of which fits between each two tiles and at the end of each bridge *j*, and each of which has a flange, *r*, on one or both sides extending in front of the adjoining tile. The plate M is drawn back toward the wall A by a bolt, *s*, Fig. 7, or by other means, and has spurs or flanges *q′* on its back to keep it from being drawn too close to the wall.

The flue L in front receives air through an aperture, *t*, whence the air flows, as indicated by the arrows, into the flue L′ and down through the perforations into the combustion-chamber. In its passage through the flue L it absorbs heat from the tiles *p p*. The flue L in the rear receives air through an aperture, *t′*. (Shown in Fig. 4.)

From another aperture, *u*, in the rear wall of the stove an air-flue, N, extends between the outer wall and lining-tiles to and across

the right-hand end of the stove, in the middle of which it communicates with the flue N′ in the hollow of the air-bridge *j*, which crosses the chamber E between the front and rear stove-holes. This flue N is or may be also supplied with air through an aperture, *w*′, in the right-hand end of the stove. The flues N and L at the rear of the stove are kept distinct by a flange, *v*, on the plate M, projecting backward between the apertures *t*′ and *u*. The plate M at the right-hand end of the stove is perforated, Fig. 4, beneath the bridge *j*, thereby admitting air from the flue N behind it directly into the chamber E. Thus more air is admitted to this chamber, and the plate M is protected by the stream of entering air and prevented from being burned out. Any or all of the other plates M M may be likewise perforated.

The bridges *j j*, forming the flues L′ L′ and N′, are arranged beneath the three short crosses *g g*, and are bolted thereto. When either of these crosses is lifted out its air-bridge *j* comes with it. Fig. 6 is an inverted plan of a short cross and its bridge. A socket is formed in each plate M and one in the partition G, opposite each plate, to receive the opposite ends of the air-bridges when the crosses are in place. In addition to their function as air-inlet flues, these bridges *j* thus arranged serve to brace or strengthen the crosses, and thereby reduce their liability to breakage, and also, by causing a current of air to pass beneath them, to prevent their becoming red-hot in use, and consequently warping or sagging. This result is due to the air in these flues being much cooler than the temperature of red-hot iron, although still so highly heated as to readily combine with the burning gases.

The fire is kindled in the usual way in the chamber E, the products of combustion passing back equally, or very nearly so, through both chambers F F and down the flue I. The fire is fed through the fire-door E′ in front, and the ashes removed from the ash-door below, as usual. The fuel is stirred, when necessary, by a straight bar or poker inserted through a hole, *w*, as formerly. The combustible constituents of the smoke are all consumed by combining with the successive portions of heated air entering the chambers E F, so that no soot is formed, and the smoke contains no uncombined carbon, even when fresh fuel is added and is beginning to evolve its dense hydrocarbon vapors.

Heretofore it has been thought necessary in order to consume the smoke from bituminous coal to pass the smoke over a bed of already coked and incandescent fuel, thereby subjecting it to a high degree of heat; but in my stove I have succeeded in producing this result by slightly choking the entrance to the flame combustion-chambers F F, thereby retaining the smoke for an instant over the bed of fuel in the chamber E, and then causing it to impinge successively on entering currents of heated air. I thus avoid the necessity of employing a double or divided fuel-chamber and of pushing the fuel back into the second chamber after it becomes coked—an operation requiring some degree of watchful attention and intelligence. The result of my improvement is that the burning of bituminous coal is rendered very nearly as simple and requires almost as little skill and attention as to burn anthracite coal.

The modified construction shown in Figs. 8 and 9 differs from that already described only in the arrangement of the flues and draft-damper. The pipe-collar *m* is arranged at the left-hand end instead of the back, and there are two flues I, one leading down from each chamber F, extending to the right under the oven, and there uniting in one central flue, which extends up to the end of the stove between the others to the collar *m*. The air-flue H no longer opens to the outer air at the left-hand end of the stove, but extends down along the left-hand end of the oven through the middle flue, I, and opens at the bottom of the stove. Between the flue H and the middle flue, I, a space, P, affords communication between the two chambers, F F, and into this space an aperture opens from the flue, closed by the direct-draft damper K, as shown in Fig. 8. I have introduced these figures to show how this common arrangement of the flues may be adapted to my stove.

It must not be inferred from my detailed description of Figs. 1 to 7 that the use of all the details of arrangement and construction referred to is essential to my invention. On the contrary, many of them may be omitted or considerably modified without materially affecting the operation of the stove.

For a very small stove, having but three holes, only one-half of my stove need be used, thereby employing but one chamber F and omitting the partition G. The draft-flues will need to be correspondingly rearranged.

For a heating-stove only the oven B may be omitted and the flues and combustion-chambers suitably rearranged.

I claim as my invention—

1. The combination, in a stove, of a fuel-chamber having a grate, two parallel gas-combustion chambers leading therefrom, a central partition separating said chambers, an air-heating flue extending through said partition, and air-inlet openings affording communication between said flue and said chambers, whereby a current of air from outside the stove is drawn through said partition and cools it, and said air becomes heated, is admitted to the burning gases, and contributes to complete their combustion, substantially as set forth.

2. The combination, in a stove, of a fuel-chamber having a grate, two parallel gas-combustion chambers leading therefrom, a central partition separating said chambers, an air-bridge across each of said chambers, an air-heating flue extending through said partition, and branch flues leading therefrom through

each of said bridges, with air-inlet perforations through said bridges admitting heated air to pass from the flues to the chambers, substantially as set forth.

3. The combination, in a stove, of a fuel-chamber, a gas-combustion chamber leading therefrom and extending beneath the stove-holes, a contraction or throat at the entrance to said chamber, an air-bridge extending across said chamber between two stove-holes, an air-heating flue extending through the space between the lining-tiles of said chamber and the shell of the stove, a branch flue extending therefrom through said air-bridge, and perforations in the latter admitting air from said branch flue into said chamber, substantially as set forth.

4. The combination, in a stove, of a fuel-chamber, two gas-combustion chambers leading therefrom and separated by a dividing-partition, an air-bridge crossing said fuel-chamber and forming a partial continuation of said partition, an air-heating flue extending through a heated wall of the stove, a branch flue leading therefrom through said bridge, and perforations in said bridge admitting air from said flue into the fuel-chamber, substantially as set forth.

5. A cook-stove consisting of the combination of fuel-chamber E, gas-combustion chamber F, leading therefrom, baffle-bricks *i i* therein, beneath the stove-holes, perforated air-bridges *j j*, depending thereinto between the stove-holes, and air-heating flues extending through the heated walls of the stove to and communicating with the interior of said bridges, substantially as set forth.

6. The combination, with chambers E and F, of tiles *p p*, lining the sides thereof, the outer shell, A, having projections *q q* to keep said tiles out of contact with it, and thereby form an air-heating space, and plates M M, having flanges for engaging said tiles and holding them back against said projections fastened to the shell A, substantially as set forth.

7. The combination, with chambers E and F, of side lining-tiles, *p p*, outer shell, A, having projections *q q*, flanged plate M, and air-bridge *j*, its interior communicating through an opening in said plate with the air-heating space or flue between said tiles and shell, substantially as set forth.

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

WILLIAM A. GREENE.

Witnesses:
BELLE F. GREENE,
ARTHUR C. FRASER.