(No Model.) 4 Sheets—Sheet 1.

J. GIBBONS.

VERTICAL BROILER.

No. 457,316. Patented Aug. 4, 1891.

Fig. 1.

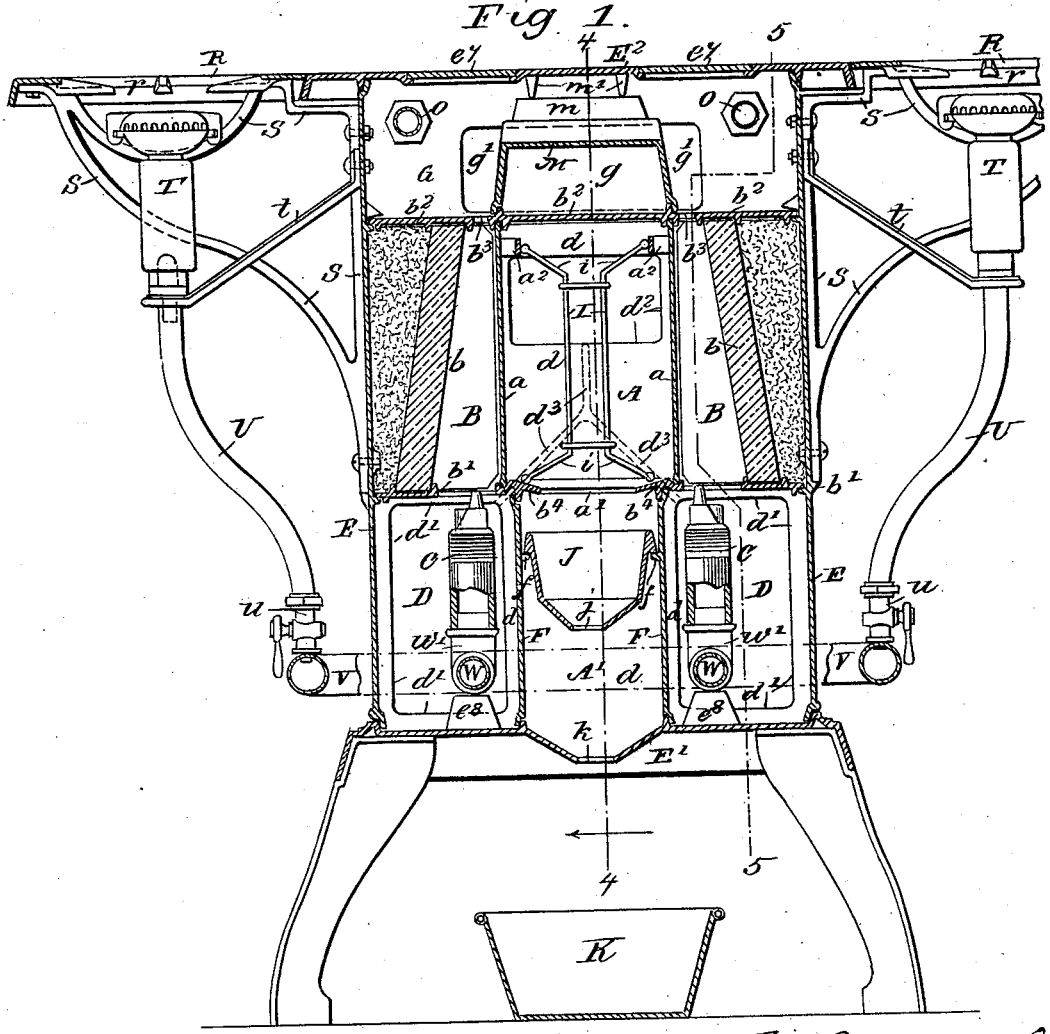


Fig. 2.

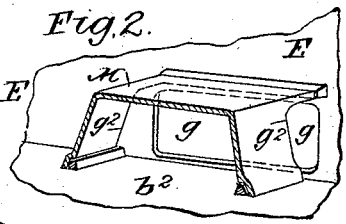
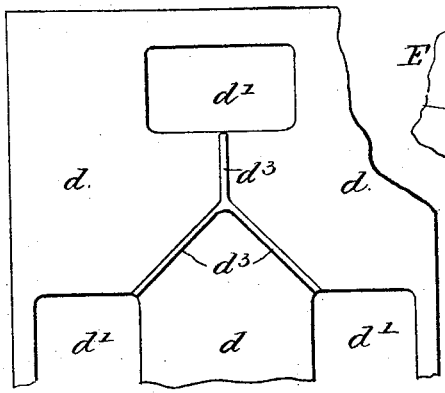


Fig. 3



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(No Model.)

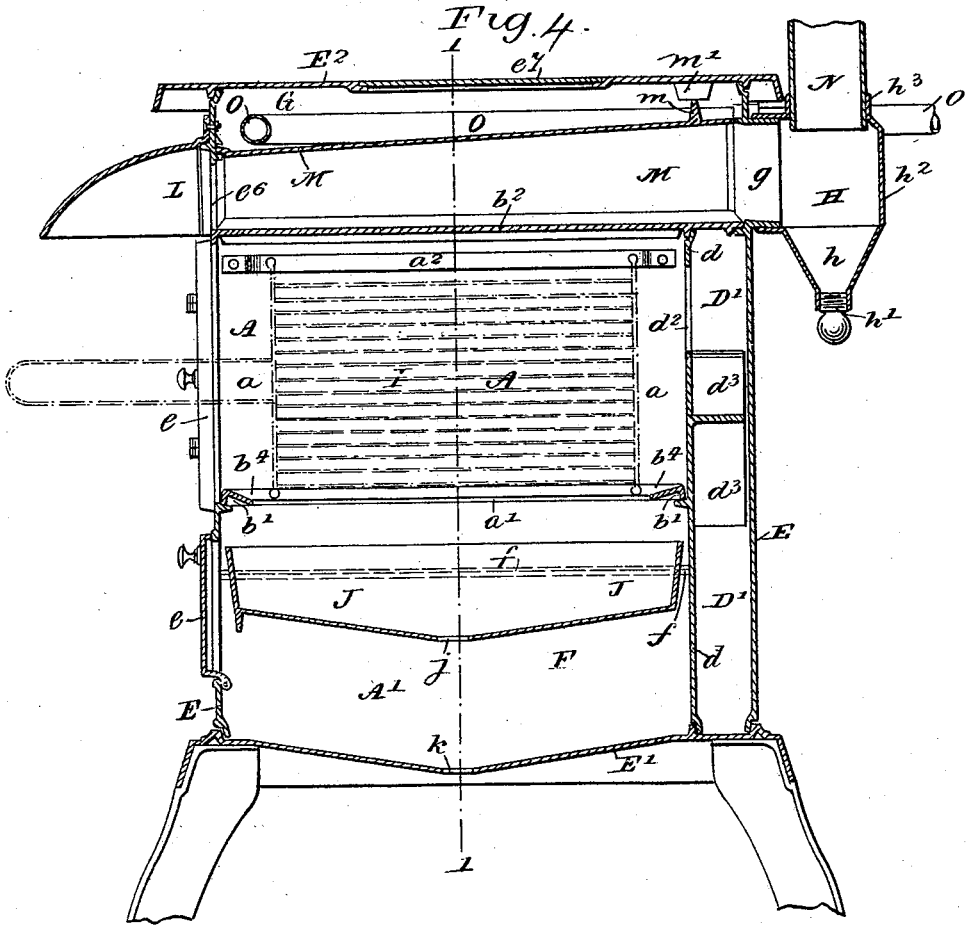
4 Sheets—Sheet 2.

J. GIBBONS.

VERTICAL BROILER.

No. 457,316. Patented Aug. 4, 1891.

Fig. 4.



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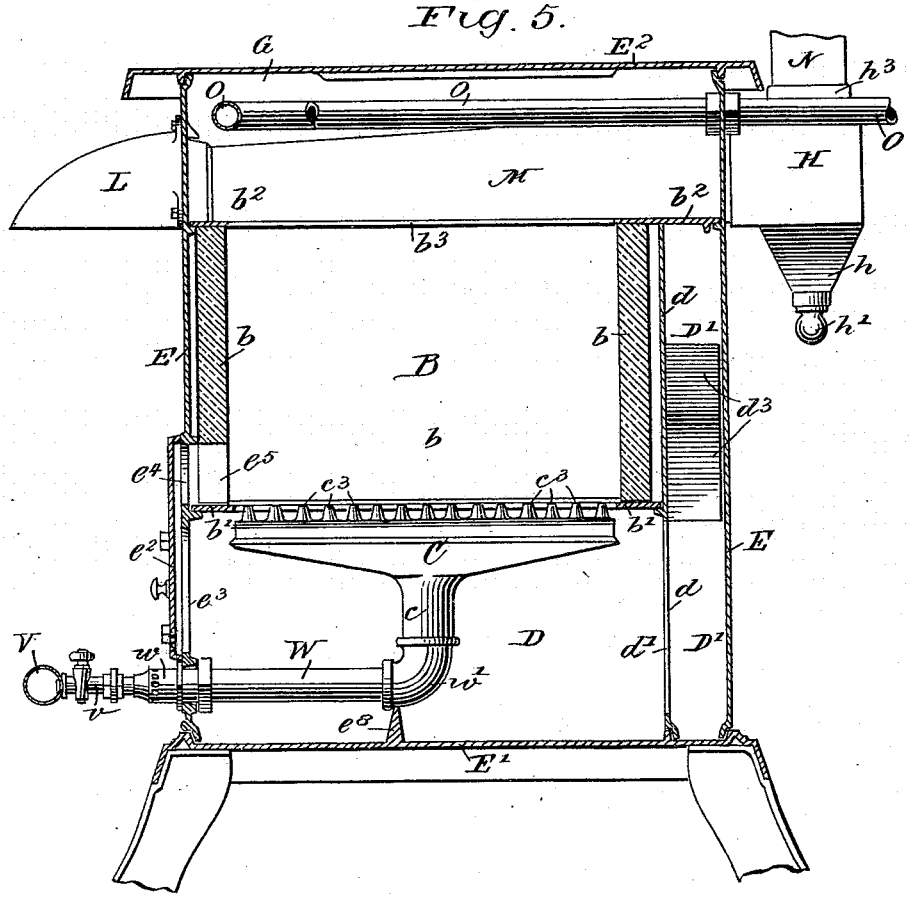
(No Model.) 4 Sheets—Sheet 3.

J. GIBBONS.

VERTICAL BROILER.

No. 457,316. Patented Aug. 4, 1891.

Fig. 5.



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No. 457,316. Patented Aug. 4, 1891.

Fig. 6.

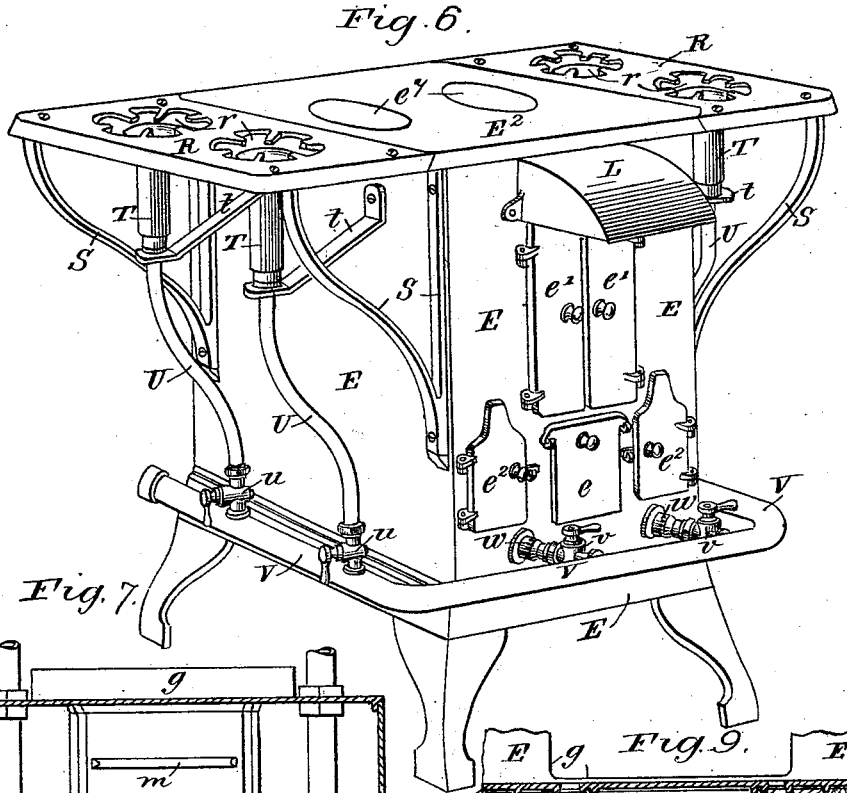


Fig. 7.

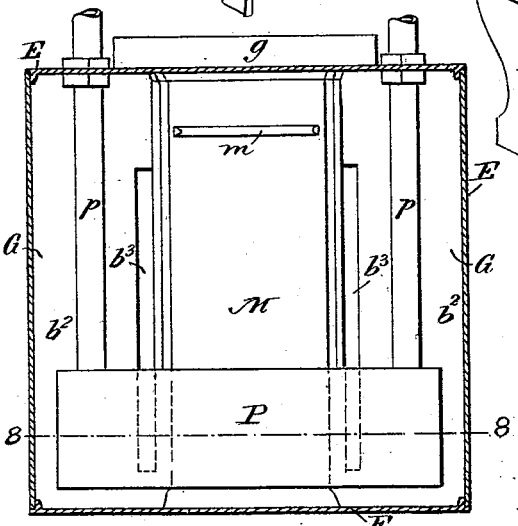


Fig. 9.

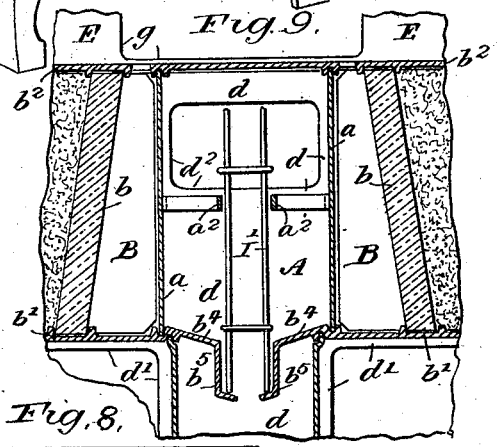
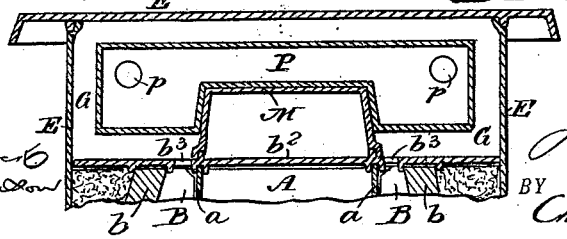


Fig. 8.



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UNITED STATES PATENT OFFICE.

JAMES GIBBONS, OF JERSEY CITY, NEW JERSEY.

VERTICAL BROILER.

SPECIFICATION forming part of Letters Patent No. 457,316, dated August 4, 1891.

Application filed April 2, 1891. Serial No. 387,417. (No model.)

To all whom it may concern:

Be it known that I, JAMES GIBBONS, of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in a Vertical Broiler, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, and in which similar letters of reference indicate corresponding parts in the several views.

My present invention relates to an apparatus designed more especially for broiling meats, fish, or other food supplies, but adapted also for auxiliary boiling, frying, or stewing operations.

The invention has for its principal object to provide a vertically-arranged broiling apparatus which consumes within itself nearly all the fatty smoky fumes or vapors given off from the food being broiled and carries what little of the fumes which escape from the front of the broiling-chamber to the hot-product flue or outlet of the apparatus, whereby the disagreeable fatty fumes are kept from the room and to a considerable extent are utilized as fuel to secure maximum economy in operating the apparatus. Other important and auxiliary advantages in structure and operation are also obtained, as hereinafter recited.

The invention consists in certain novel features of construction and combination of parts of the apparatus, as hereinafter described and claimed.

In the drawings, Figure 1 is a front or transverse vertical sectional view of the broiler apparatus, taken on the line 1 1 in Fig. 4 and partly broken away. Fig. 2 is a detail perspective view showing another arrangement of the final upper hot-product outlets. Fig. 3 is a detail rear face view of a portion of the intermediate partition-plate which forms the rear wall of the broiling and fire chambers. Fig. 4 is a central vertical sectional side view of the apparatus, taken on the line 4 4 in Fig. 1, with the grid indicated in dotted lines. Fig. 5 is a vertical sectional side elevation of the broiler, taken on the irregular line 5 5 in Fig. 1. Fig. 6 is a perspective view of the broiler apparatus. Fig. 7 is a plan view with the broiler-casing in horizontal section through the upper hot-product chamber of the apparatus and illustrates a modified arrangement of the water-back or heater device. Fig. 8 is a detail transverse vertical section taken on the line 8 8 in Fig. 10; and Fig. 9 is a detail front vertical sectional view of the broiling and fire chambers, illustrating a modification of the grid and its supports.

The broiling-chamber A of the apparatus is located or arranged vertically between two opposing contiguous plates or walls *a a*, which may be either cast or sheet metal and are set about at the center of the structure, and are preferably imperforate and made to slide in or out from the front, so as to be readily removable from the frame for purposes of cleaning, repair, or renewal of the parts. Behind each cooking plate or wall A is a fire-chamber B, which receives the hot products of a burner C, which is located in a lower chamber D. These two side combustion-chambers D D, which communicate, respectively, with the two fire-chambers B B, also communicate freely with a rear passage D′, formed in the broiler casing or frame E behind the broiling-chamber A by a suitable intermediate vertical wall or partition *d*, which at its main upper portion extends from side to side of the casing E to form a backing to the rear end parts of the fire-brick or other refractory linings *b b* of the two fire-chambers. At its lower central portion this partition *d* extends down to the bottom or base plate E′ of the casing, so as to form in connection with two vertical plates F F, fitted between the lower horizontal wall or fire-brick supporting-partition *b′* of the fire-chambers and the base-plate, a lower central chamber A′, which virtually is a downward extension of the broiling-chamber A, both chambers communicating by a comparatively large central opening *a′* in the plate *b′*. Openings *d′ d′* at the lower side parts of the partition *d* provide free communication between the rear passage D′ and the two lower chambers D D, which open to the fire-chambers B B, as above mentioned.

A horizontal plate b^2, fitted in the casing E a short distance—say four inches—below the top plate of the casing, partitions the fire-chambers B B from an upper hot-product chamber G at the top of the apparatus. This

plate b^2 has two comparatively long and narrow slots or openings b^3 b^3, which allow passage of hot products from both fire-chambers B B into the chamber G, which has an outlet at g through the back plate of the casing to any suitably-connected discharge pipe or flue, and preferably to a trap-fitting or elbow H, which is adapted to a flange-collar on the casing, and has a pendent trap portion h catching the condensed fluid-deposits from the pipe N, which connects with an upper collar or flange h^3 of the fitting. The side walls h^2 of the trap-fitting preferably stand off laterally from the end of the flue-pipe N to give clear fall of deposits into the trap h, which preferably has a suitable plug h', allowing discharge of the trapped deposits at pleasure. The spaces between the inclined side parts of the fire-chamber brick-linings b and the casing E and horizontal partition-plates b' b^2, above mentioned, are preferably filled with asbestus, mineral wool, or other suitable non-conductor of heat, as shown in Fig. 1 of the drawings.

It will be noticed that the plate b^2 forms a closed top to the broiling-chamber A and that the intermediate wall or partition d at the rear end of said chamber is provided with an opening d^2, allowing direct passage of air, mingled with fatty fumes from the substance being broiled in the chamber, rearward into the space D', which opens below at d' d' into the lower burning-chambers D D, into which the hot air and fumes thus pass, whence they rise into the two fire-chambers B B, wherein the air maintains combustion of the fluid fuel flaming at or from the burners, and the greasy smoky fumes are also entirely consumed to prevent undue accumulation of highly-inflammable fatty or greasy deposits in the outlets at b^3 G g H and in the flue giving final exit of the hot products from the apparatus. This desirable result, which prevents the flue-outlets from easily taking fire, is attained, while the greasy fatty fumes consumed in the fire-chambers furnish additional fuel to increase the heating effect of the burners upon the opposing cooking-walls a a of the broiling-chamber, which are maintained preferably at a dull red heat.

Figs. 1, 4, and 5 of the drawings show that behind the broiling-chamber A, below the rear outlet d^2 therefrom, is placed in the passage D' a partition rib or flange d^3, which extends between the chamber-wall d and the rear plate of the main casing E and is preferably vertical and central at its upper part and at its lower part slopes off at an angle to either side and stops at the two lower side openings d' d' of the plate d. This rib or flange d^3 has a twofold purpose. It re-enforces the back plate d of the broiling-chamber from the rear plate of the casing to prevent breaking or injury of said plate d by violent contact of the inner hinged end of the grid device I with it, and it also divides the hot air and greasy fumes escaping through the broiling-chamber opening d^2 and more certainly conducts said hot products in like volume to both lower chambers D D, and consequently evenly distributes between the two fire-chambers B B the fatty fumes to be consumed therein.

The central portion of the horizontal plate b', or that part of it at the bottom of the broiling-chamber A has a central opening a', through which fat drippings from the substance being broiled in the grid I fall into a receiving pan or tray J, which is preferably fitted to slide endwise into and out of the casing E when the lower central front door e thereof is opened, said drip-tray being preferably sustained on ribs or flanges f f on the opposing lower side walls F F of the lower chamber A' of the apparatus. This tray has a bottom which slopes to an opening j, through which the fat drippings fall to the bottom plate E' of the casing, which at the chamber A' may be sloped every way toward a central opening k, through which the fat drippings finally fall into a suitable pan or receiver K, placed on the floor or bench support of the apparatus. If desired, the bottom plate E' may be cut away to leave the lower chamber A' practically bottomless, the drip-tray J in this case preventing too free upward circulation of cool air to the broiling-chamber A above it.

Figs. 1 and 4 of the drawings best show that all that part of the plate b' within the broiling-chamber A and bordering the fat-drip opening a' thereof slopes downward from the side and end walls of the chamber to the opening. This construction assures immediate downward discharge of liquid fat from the ledge b^4 and obviates lighting of the fat by the heat of the cooking-walls. This ledge b^4 by its side parts also supports the grid I, the lower lateral extensions i of which rest upon it, while the upper lateral extensions i of the grid may enter between the opposite guides a^2 a^2, fastened to the cooking-walls a a to steady the grid centrally within the broiling-chamber.

The modification shown in Fig. 9 of the drawings illustrates how more prominent rails or plates a^2 a^2 may be attached to the cooking-walls a a to guide and steady an ordinary flat-sided grid I' centrally within the broiling-chamber A, this grid being sustained at its lower edge within a recess or pocket b^5, pendent from the inclined or sloping drip-surface b^4 of the plate b'. An opening at the bottom of this grid-sustaining pocket b^5 allows drip of fat to the tray J beneath it. It will be noticed that this construction with the pocket b^5 and either with or without the lateral side guides or steadiments a^2 a^2 in the broiling-chamber allows effective use of an ordinary flat-sided grid, or one without lateral outward projections from its side parts or frames.

The door e, which closes the front opening to the lower central drip-tray chamber A', is preferably a drop-door held by lateral pins, which project at each side of said opening be-

hind the front of the casing E. This door in opening downward stops against the front gas-supply rail or pipe of the apparatus. The broiling-chamber A is preferably fitted at the front with two side hinged doors e' e', which with the door e will be closed while the cooking-walls are being heated up ready for work, and when broiling is being done said doors e' may or may not be closed as far as the projecting handles of the grid will allow.

Lower side front doors e^2 e^2 are peculiarly formed, so as to each cover an opening e^3 of the casing, giving access to a lower side chamber D to allow introduction and adjustment of the burner C and for cleaning out said burner-chamber, and also to cover an upper smaller opening e^4, which aligns with a front opening e^5 in the end of the fire-brick b and gives access to the fire-chamber B by a taper or match for lighting the burner and also serves as a sight-hole for inspection of the burner to determine if it is flaming or working properly. These doors e^2 are also preferably hinged at one side edge, as shown more clearly in Fig. 6 of the drawings.

While most of the fatty or greasy fumes from the meat or substance being broiled escape rearward through the broiling-chamber opening d^2 and thence to the fire-chambers, where they are consumed, as above described, a comparatively small volume of these fumes will escape at the front of the broiling-chamber. It is desirable that these latter fumes be prevented from escaping into the kitchen or room. Hence I provide for carrying them off rearward through a front projecting hood L, which by an opening e^6 in the front wall of the main casing communicates with an interior cap or conduit M, which is open at both ends, and at its rear end communicates with the outlet g of the upper hot-product chamber G of the apparatus. This inner conduit M preferably overlies the broiling-chamber A, but, unlike a former broiler made by me, it has no direct communication with the broiling-chamber through the partition-wall b^2, which in the prior construction was provided with openings with a damper thereat to allow all fatty fumes from the food being broiled to pass into the conduit and thence to the outlet flue or chimney, instead of most of the fumes being conducted to and burned within the fire-chambers, as in this apparatus. The outlet g, as shown in Figs. 1 and 7 of the drawings, is wider than the inner open end of the conduit M to allow exit through end parts g' g' of said outlet of the hot products which rise from the fire-chambers B through the openings b^3 into the chamber G of the apparatus; but it will probably be preferable to form the hot-product outlets as shown in Fig. 2 of the drawings, wherein the casing-outlet g is no wider than the conduit M, which is cut away at g^2 g^2 at both sides next the outlet g. This construction causes the hot products from the fire-chamber outlets b^3 to enter the rear end of the conduit on their way to the final outlet g and promotes increased or stronger rearward draft of fatty fumes through the conduit M to said outlet g. The parts L M are preferably flange-jointed to the front of the main casing E, and at its inner end the conduit M preferably has an upwardly-projecting rib or flange m, which is pressed by ribs or flanges m' on the top E^2 of the broiler to hold the conduit down snugly at its rear part and also at its side flange-joints with the partition-plate b^2. Ordinary nibs hold down the front of the conduit M and also the plate b^2 on which it rests.

I provide this broiling apparatus with a water-back device located in the upper hot-product chamber G and to be heated by hot products from the two lower fire-chambers B B before said products escape at the exit-flue, thus utilizing these products to maintain a supply of hot water through the medium of the water-back. This water-back may be variously formed—as, for instance, it may consist of a simple bent pipe O, extending along the front and sides of the chamber G and passing through the back wall of the broiler to receive the circulating-boiler connnections, as will be understood from Figs. 1, 4, and 5 of the drawings, or the water-back may comprise a hollow reservoir P, located, preferably, along the front of the chamber G and having pipe connections p p passing through the casing for attachment to the circulating-boiler, as will appear in Figs. 7 and 8 of the drawings. By placing the water-back reservoir P well toward the front it interferes little, if any, with the effective use of frying, boiling, or stewing vessels on the top plate E^2 of the broiler, which is shown with two oval-shaped pot-holes closed by lids e^7 e^7. When the interior conduit M is used, the water-back reservoir P will preferably be supported by it and clear above the plate b^2 to avoid choking up the outlets b^3 from the fire-chambers and let the heat play all around the reservoir. Should this conduit be dispensed with, the reservoir may be sustained by feet directly from the plate b^2. It will be noticed that the front crossing portion of the pipe water-back O is also sustained by the fume-conduit M and that said water-back extends over the hot waste-product outlets of the two fire-chambers of the apparatus.

I propose fitting this broiler apparatus, and, preferably, at each side, with a skeleton shelf or hot plate R, supported by suitably-designed brackets S from the main casing E, and having a couple of radial ribbed openings r r, toward which flame suitable fluid-fuel burners T T, which, as shown, are sustained from the casing by brackets t and are connected to fuel-supply pipes U, which have cocks u and connect with rearward side extensions of the tubular gas-rail V, which supplies the main burners C C of the broiler. It will thus appear that while broiling is being done in the chamber A a portable baking or roasting oven (not shown) may be used on top of the casing and

be heated by hot products therefrom when the covers or lids e^7 are removed, and at the same time boiling, stewing, or frying operations may be performed over one or more of the side burners T in vessels sustained on the hot plate or plates R, and the water-back O or P simultaneously heats water for either culinary or cleaning purposes. Hence every convenience is afforded in this one gas-operated structure for doing all kinds of cooking or heating that an entire household may require.

The broiling-burners C have a tubular stem *c*, which is preferably fitted by a plain slip-joint upon a collar which projects upward from the elbow-fitting w', to which is connected the mixing tube or pipe W, which at its other end is held to an outer air-bulb *w*, the inlet-apertures of which are outside the main casing E. To this bulb is connected the gas-admitting nipple, which is held to a cock or valve *v*, controlling supply of gas from the main feed-rail V to the burner. A lug e^8 on the bottom plate E′ holds the burner up to place and relieves the front air-bulb and mixing-tube connection of undue strains.

In conclusion I specially mention that in this apparatus the air which enters at the front of the broiling-chamber and sweeps rearward through it to the back opening d^2 thereof is highly superheated by its passage between the two hot cooking-walls *a a* of the chamber. Hence the said air, laden with fatty fumes from the meat or substance being broiled, passes down the rear channel D′ and thence to the lower chambers D D and then upward to the fire-chambers B B in highly-superheated condition, and in this state maintains combustion at the burners at a higher temperature than would be possible otherwise or if comparatively cool air were fed to the burner-tips to maintain combustion. The marked difference as regards the use of superheated air for maintaining combustion at the burners between this broiler and one heretofore made by me consists in the initial superheating of the air directly by the broiling-chamber walls and within the chamber itself prior to passage of the air to the fire-chambers instead of superheating the air by causing it to enter at upper openings of the main outer casing and taking up heat from the exterior walls of the fire-chambers before entering said chambers.

Another improved feature worthy of notice is that, while in the former construction the passage of air into the front of the broiling-chamber and thence through its open top wall into a cap or conduit which conducted it and commingled fatty fumes directly to the outlet-flue had some considerable effect to brown the broiled surfaces of the meat by contact of the passing air with it, in the present construction the entire surfaces of the food are much more nicely browned, as the air sweeps clear through the broiling-chamber from front to rear and no portion of the broiled food is left with an undesirable pale or livid color. Hence it is far more appetizing and palatable.

I have hereinbefore mentioned the important feature of supplying the inside of the burners only with pure atmospheric air admitted at the air-bulbs *w* and mingling with gas admitted to the mixing-tubes of the burners, while combustion at the flaming points of the burners is maintained by a mixture of superheated air and fatty fumes from the broiling-chamber. By this operation the fatty fumes are not allowed to enter the inside of the burners and clog them or interfere with their working with very hot blue flames, and at the same time the fatty fumes consumed by said flames with the superheated air in the fire-chambers only increases the heating effect of the burners upon the broiler cooking-walls, and thus promotes continued economy of gas in operating the apparatus. As the burner-chambers D′ become quite hot and as the mixing-tubes W are within said chambers, the fluid fuel is superheated before it reaches the flaming-points c^3 of the burners, which increases the effectiveness of the burners.

I am aware that cooking apparatus have before been made with a broiling-chamber having direct communication with one or more side fire-chambers which therefore consumed fatty fumes from the food; but these prior constructions are clearly distinguishable from my apparatus, in that while in them the fumes are consumed the food being broiled next or between the fires was tainted by the gaseous products of combustion or the dust thereof, while in my apparatus, wherein there is an indirect communication between the broiling-chamber and the fire-chambers or sources of heat, the fatty fumes from the food being broiled are consumed without causing the food to be contaminated by the gaseous or other products of the fluid-fuel burners or any other sources of heat employed, and this is a most important consideration, as will readily be understood.

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

1. A broiling apparatus made with a central or intermediate food-broiling and air-superheating chamber and fire-chambers at the sides thereof, said broiling-chamber communicating indirectly with the fire-chambers which consume fatty fumes from the food, substantially as described.

2. A broiling apparatus made with a central or intermediate food-broiling and air-superheating chamber, fire-chambers at the sides thereof and communicating indirectly therewith and consuming fatty fumes from the food, and an upper conduit receiving and carrying off fumes escaping at the front of the broiling-chamber, substantially as described.

3. A broiling apparatus made with a cen-

tral or intermediate food-broiling and air-superheating chamber, fire-chambers at the sides thereof and communicating indirectly therewith and consuming fatty fumes from the food, an upper conduit receiving and carrying off fumes escaping at the front of the broiling-chamber, and a hood projecting at the front of said conduit, substantially as described.

4. A broiling apparatus made with a central or intermediate food-broiling and air-superheating chamber, fire-chambers at the sides thereof and communicating indirectly therewith and consuming fatty fumes from the food, an upper chamber receiving the hot products and having an outlet therefor, and a conduit in said upper chamber communicating with its outlet and carrying off fumes escaping at the front of the broiling-chamber, substantially as described.

5. A broiling apparatus made with a central or intermediate food-broiling and air-superheating chamber, fire-chambers at the sides thereof and communicating indirectly therewith and consuming fatty fumes from the food, an upper chamber receiving the hot products and having an outlet therefor, a conduit in said upper chamber communicating with its outlet and carrying off fumes escaping at the front of the broiling-chamber, and a hood at the front of said conduit, substantially as described.

6. A broiling apparatus made with a central or intermediate broiling-chamber, fire-chambers at the sides thereof, an upper chamber receiving the hot products and having an outlet therefor, and a conduit in said upper chamber carrying off fumes escaping at the front of the broiling-chamber, and a conduit having openings through its rear portion, forming a lateral passage for the hot products of the fire-chambers toward the hot-product outlet, thereby inducing increased rearward draft of fatty fumes through the conduit, substantially as described.

7. The combination, in a broiling apparatus, of a casing, a food-broiling and air-superheating chamber A therein, fire-chambers B B next the broiling-chamber, chambers D D below the fire-chambers, fluid-fuel burners in the chambers D, and an outlet-chamber G above the chambers A B B, passages d^2 D′ d' being provided between the chambers A D D, substantially as described.

8. The combination, in a broiling apparatus, of a casing, a food-broiling and air-superheating chamber A therein, fire-chambers B B next the broiling-chamber, chambers D D below the fire-chambers, fluid-fuel burners in the chambers D D, a chamber G above the chambers A B B and having an outlet g, passages d^2 D′ d' being provided between the chambers A D D, and a conduit M in the chamber G, substantially as described.

9. The combination, in a broiling apparatus, of a casing, a food-broiling and air-superheating chamber A therein, fire-chambers B B next the broiling-chamber, chambers D D below the fire-chambers, fluid-fuel burners in the chambers D D, a chamber G above the chambers A B B and having an outlet g, passages d^2 D′ d' being provided between the chambers A D D, a conduit M in the chamber G, and a hood L at the front of the conduit, substantially as described.

10. A broiling apparatus made with a central or intermediate food-broiling and air-superheating chamber, fire-chambers at the sides thereof, an indirect passage being provided for escape of hot air and fatty fumes from the broiling-chamber to the fire-chambers, and a deflecting-plate in said passage distributing the air and fumes to both fire-chambers, substantially as described.

11. A broiling apparatus made with a central or intermediate food-broiling and air-superheating chamber A, fire-chambers B B at the sides thereof, chambers D D being provided below the fire-chambers, passages d^2 D′ d' being also provided between the chambers A D D, and a wall re-enforcing and fume-distributing plate d^3 in the passage D′, substantially as described.

12. A broiling apparatus made with a central or intermediate broiling-chamber and fire-chambers at the sides thereof, the bottom plate or wall of the fire-chambers being extended within the broiling-chamber as a marginal sloping fat-dripping ledge, substantially as described.

13. A broiling apparatus made with a broiling-chamber having a lower vertical grid-sustaining pocket, substantially as described.

14. A broiling apparatus made with a central or intermediate broiling-chamber and fire-chambers at the sides thereof, said broiling-chamber having an open bottom comprising a sloping fat-dripping ledge and a central vertical grid-sustaining pocket, substantially as described.

15. A broiling apparatus made with a broiling-chamber having a lower vertical grid-sustaining pocket between its opposing cooking-walls, said walls having inwardly-extending lateral rails or projections guiding and centrally steadying the grid when in said pocket, substantially as described.

16. A broiling apparatus made with a central or intermediate food-broiling and air-superheating chamber, fire-chambers at the sides thereof and communicating indirectly therewith to consume fatty fumes from the food, and fluid-fuel burners heating the broiling-chamber cooking-walls and provided at their mixing-tubes and outside the burner or fire-chambers with openings admitting atmospheric air, substantially as described, whereby the gas and air mixture in the burners is not vitiated by the hot air and fatty-fume mixture consumed in the fire-chambers, as set forth.

17. The combination, in a broiling apparatus, of a casing, a broiling-chamber A, fire-chambers B B at the sides thereof, and burn-

er-chambers D D below the fire-chambers, said casing having front openings e^3 e^4 to the chambers D B, respectively, and doors or gates, each closing the vertically-ranging pair of openings e^3 e^4 of one communicating pair of chambers D B, substantially as described.

18. The combination, with a broiling apparatus comprising a casing, a broiling-chamber therein, and two fire-chambers, one at each side of the broiling-chamber, said casing having an upper outlet-chamber receiving the hot products from both fire-chambers, and a conduit traversing the outlet-chamber and carrying fatty fumes from the front of the broiling-chamber, of a water-back device sustained by or from the fume-conduit within the upper outlet-chamber and extending over the hot waste-product outlets of the fire-chambers, substantially as described.

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