

J. GIBBONS.
BROILING APPARATUS.

No. 458,362.

Patented Aug. 25, 1891.

Fig 1.

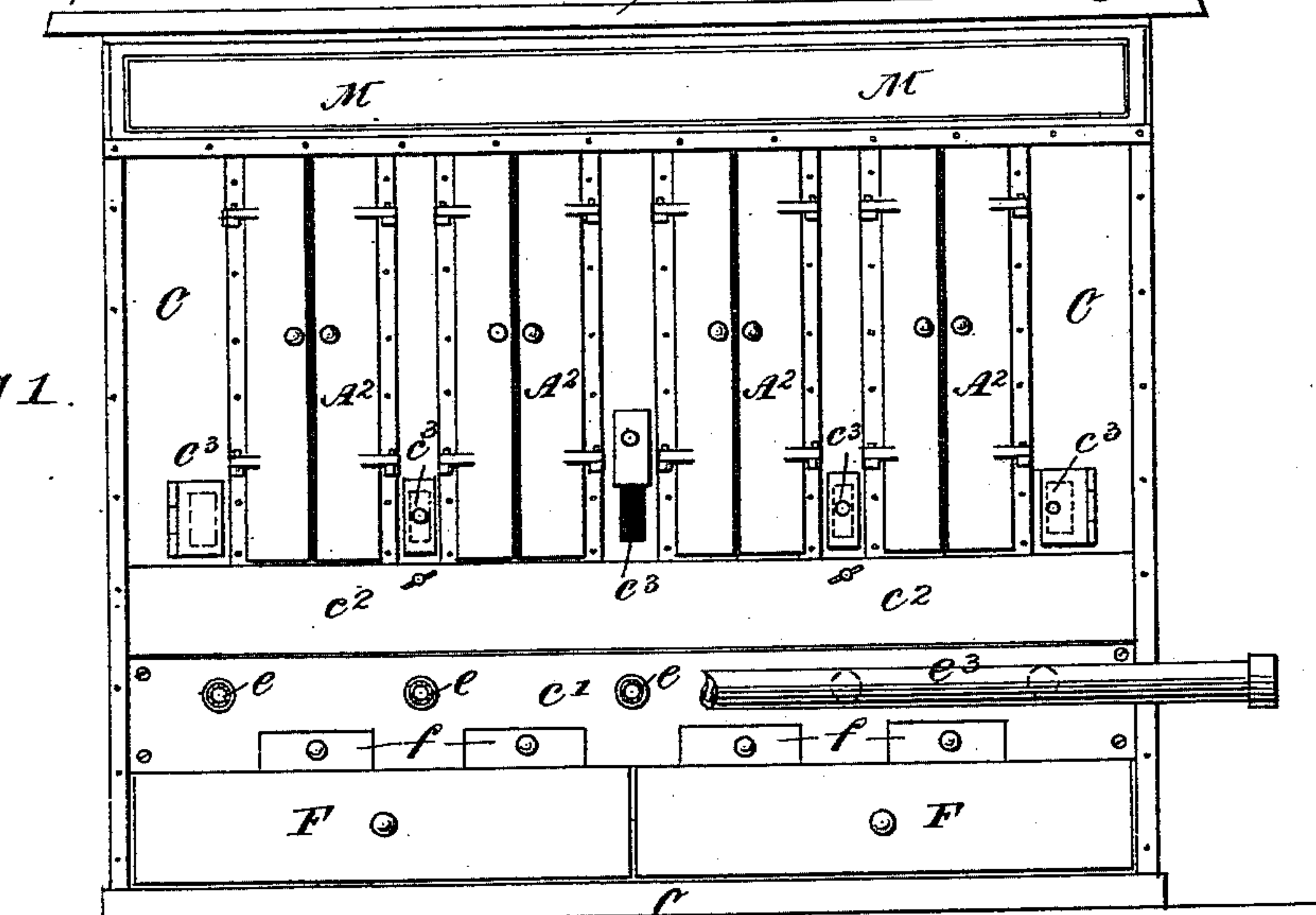


Fig 2.

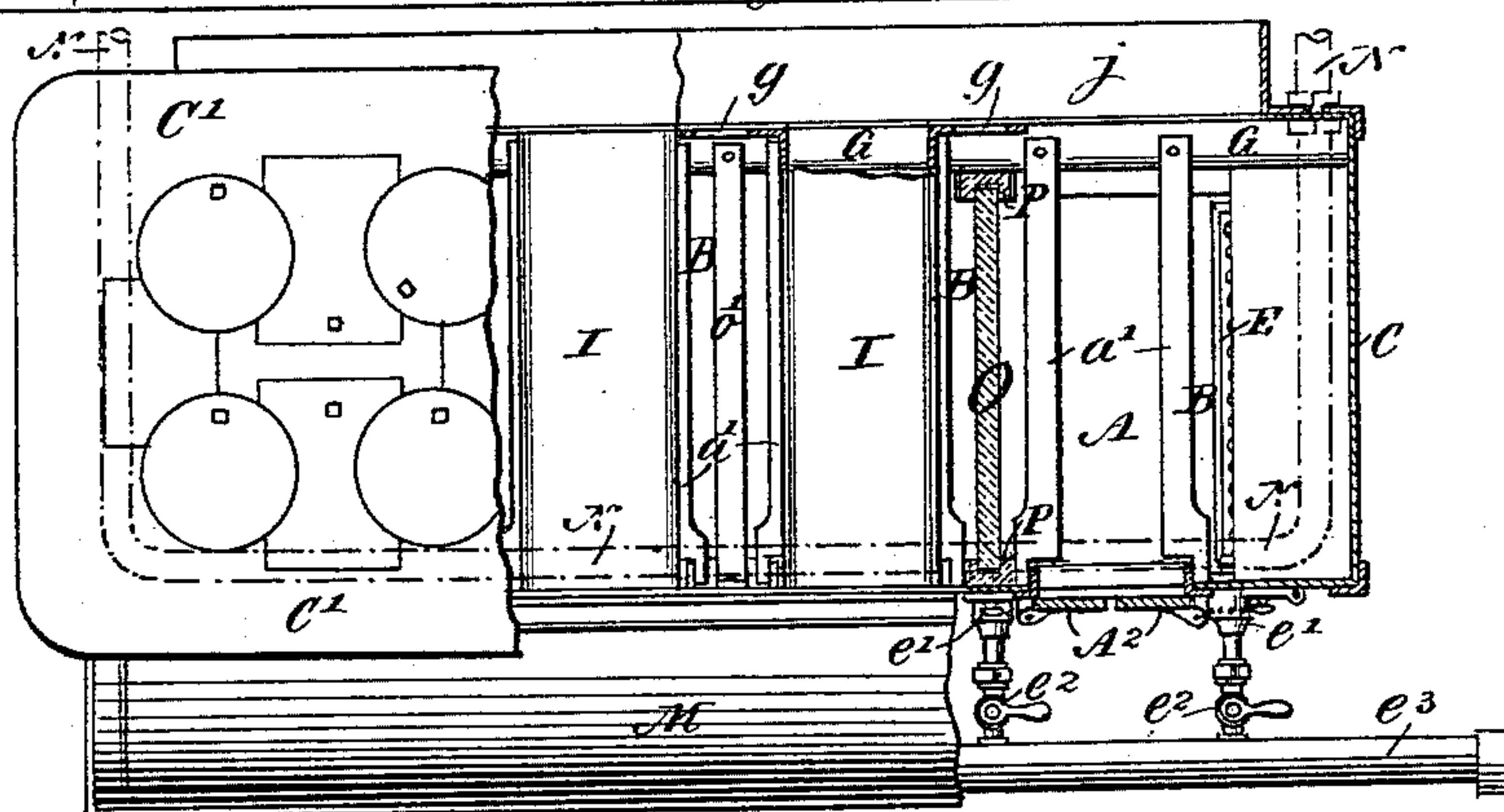
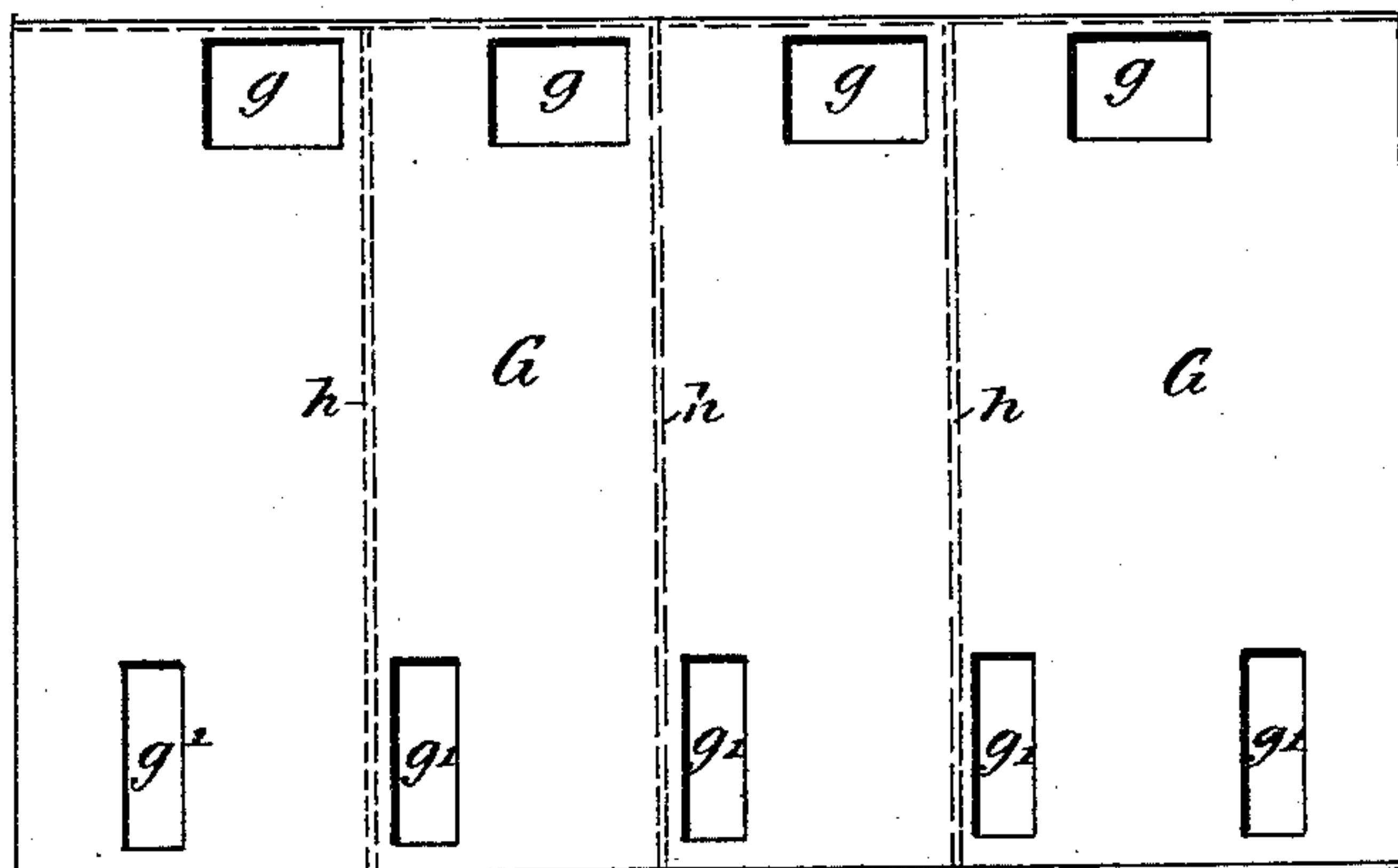
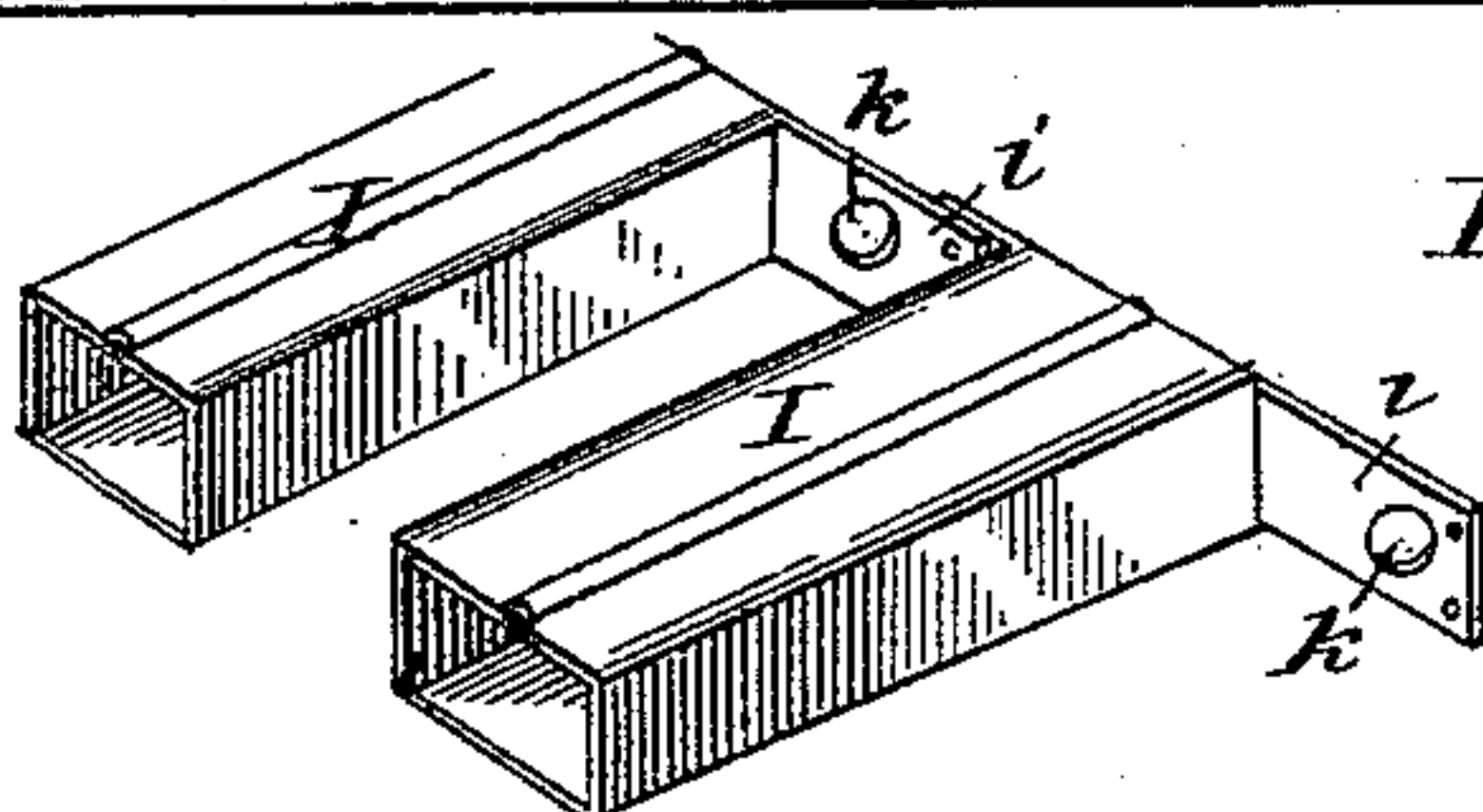


Fig 3.



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Fig 4. James Gibbons

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2 Sheets—Sheet 2.

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BROILING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 458,362, dated August 25, 1891.

Application filed April 13, 1891. Serial No. 388,744. (No model.)

To all whom it may concern:

Be it known that I, JAMES GIBBONS, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Broiling Apparatus, of which the following is a full, clear, and exact description.

My invention relates to apparatus designed for broiling meats, fish, and other food products, and more especially adapted for use in hotels or restaurants, where extensive and prompt service of food is necessary. This apparatus is of duplex or multiple character—that is to say, there are a series of broiling-chambers arranged side by side.

The object of the present invention is to improve the construction of the broiling and cooking apparatus shown and described in pending or concurrent applications bearing Serial Nos. 351,243, 353,375, and 387,417, in such manner as shall make the apparatus more convenient, safe, and economical in use.

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

Reference is to be had to the accompanying drawings, forming a part of this specification, and in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a front elevation of my improved broiler with the fluid-fuel-feed pipes partly broken away. Fig. 2 is a plan view of the apparatus partly broken away and in section in different horizontal planes. Fig. 3 is a front view of the rear wall-plates of the broiling and fire chambers. Fig. 4 is a detail perspective view of a few of the upper fume-conduits of the apparatus. Fig. 5 is a transverse vertical sectional view taken through one of the broiling-chambers, with two grids indicated therein in dotted lines. Fig. 6 is a transverse vertical sectional view taken through one of the fire-chambers of the apparatus, and Fig. 7 is a front vertical sectional view of the apparatus.

The broiler shown in the drawings is of quadruplex construction, or has four independent broiling-chambers A A A A and five fire-chambers B B B B B to heat them, all preferably arranged within a common casing or frame C. It will be understood, however,

that the same novel principles of construction may be embodied in a broiling apparatus having but two or three or more than four broiling-chambers.

The outside walls of the two end fire-chambers B B of the apparatus are formed, preferably, of inclined fire-bricks *b b*, with a backing *b'*, of asbestos or other non-conducting material, behind them or between them and the end walls of the main casing. The other or inner walls of the two end fire-chambers, as also both side walls of the other or intermediate fire-chambers, are formed by the cooking plates or walls *a a*, which are preferably made of comparatively thin metal, either cast or rolled, and are preferably fitted to slide into place from the front of the casing upon or into suitable guides or slideways *a'*, which, as shown, form parts of the top and bottom walls or plates of the fire and broiling chambers of the broiler. These cooking-walls *a* will be hereinafter more particularly described.

Below each fire-chamber B there is a communicating or auxiliary chamber D, in which is located the burner or, it may be, burners E, of any suitable character or any other approved source of heat, the hot products of which will rise into the fire-chamber to heat the cooking walls or plates *a* of the broiling-chambers. I prefer the fluid-fuel burners shown, which are held to mixing-tubes *e*, extended to atmospheric air-inlet and gas-nipple supply-bulbs or devices *e'* outside the main casing and connecting by suitable cocks *e²* with a main tubular rail *e³*, to which a gas-supply pipe will be coupled. The side walls of the burner-chambers D are preferably fixed or permanent, as also is the lower plate *d*, which forms the bottom to all these chambers, and the lower chambers A', located below the broiling-chambers A, and being practically lower extensions thereof. The plate *d* has apertures or openings at the bottoms of the chambers A' to allow final drip of the fat from the food being broiled in the chambers A to receiving pans or drawers F, which are fitted to draw out from and close the front of the casing between its plate *d* and bottom plate *c*. I prefer to intercept the dripping fat by trays *f*, placed on the plate *d* and provided with a few comparatively small bottom

holes, through which the fat finally falls into the main receivers F below. The trays protect the main body of the fat in the pans F from the heat of the broiling-chambers and prevent lighting of the fat in the pans and also shield the pans from dust. The trays draw out from the fixed front plate c' of the casing, to which the burner-pipes are held, and above this plate c' is a removable or openable front plate c^2 , giving free access to the burners and retained by suitable lips and turn-buckles. Front holes c^3 also are provided at the lower front portions of the fire-chambers to allow introduction of a taper to light the burners and also permit inspection of them to determine if they are working properly. These sight-holes may be closed either by sliding or hinged lids or covers, as shown in Fig. 1 of the drawings.

A partition-plate G extends clear across the casing C, preferably within an inch or two of its rear wall, and forms the back wall of all the broiling, fire, and burner chambers of the apparatus. The upper edge portion of this plate G is flanged rearward to the rear wall of the casing, thereby making a space or passage H between the plate and said rear wall. Openings g in the plate G establish communication between the passage H and the upper rear portion of each of the broiling-chambers A of the apparatus, and lower openings g' in the plate G connect said passage with each of the burner-chambers D of the broiler. The tops of the broiling-chambers are closed, either by the bottoms of the upper fatty-fume conduits I, which are in the upper hot product-chamber J of the apparatus, or it may be by separate imperforate cap-plates. A wide flanged opening j conducts the waste hot products received in the chamber J from all the fire-chambers B out through an elbow or other suitable fitting K, to which a flue-connecting pipe will be attached, said hot products escaping from the chamber J through a few quite contracted openings k in the back wall of the casing, in order to prevent too free draft through the apparatus and confine the heat, and assure most effective heating of the broiling-chamber, cooking-walls, and also to allow boiling, stewing, or frying on the top plate C' of the casing, which has ordinary pot-holes to receive the cooking vessels or utensils. After the contiguous opposing cooking walls or plates $a a$ of any one or more of the broiling-chambers A are heated sufficiently by the burners E, flaming behind them, and one or more grids L (shown in dotted lines in Fig. 5 of the drawings and containing food to be broiled) are suspended or supported within a broiling-chamber, and after the doors A^2 of said chamber are closed as far as the grid-handles will allow (or should the doors be left open) the food will be broiled on both sides at once by heat radiated from the cooking-walls $a a$ of the chamber, and atmospheric air, which is drawn inward freely at the front of the chamber, will sweep rear-

ward past the meat or food and cause it to be nicely browned on both sides, and at the same time the air is highly superheated as it passes by the hot cooking-walls. This superheated air laden with fatty fumes escaping from the food is then drawn rearward through the broiling-chamber opening g into the passage H, and thence downward to and through the opening g' into the burner-chamber D, whence the commingled superheated air and fatty fumes rise past the burner-tips to maintain very hot combustion thereat and in the fire-chambers B B at opposite sides of the broiling-chamber, the fatty fumes serving as additional fuel and promoting economy of fluid fuel in operating the apparatus. The products of combustion enter the upper chamber J and pass off at k K to the final exit-flue. The atmospheric air and gas entering the burner-bulbs e' and commingling within their mixing-tubes e and fed thence to the burner-tips is entirely free from the fatty fumes which pass upward around the outside of the burner into the fire-chambers. Hence the burners always give clear blue and very hot flames to promote most effective consumption of the fatty fumes as fuel within the fire-chambers. It will also be noticed that because of the indirect or circuitous course of the hot air and fatty fumes from the broiling-chamber to the fire-chambers, together with the substantially imperforate construction of the broiling-chamber cooking-walls, the broiling is effected without contamination of the food by gaseous or other products of the sources of heat employed in the fire-chambers.

I prefer to subdivide the superheated air and fatty-fume passage H, in order to restrict said air-and-fume mixture escaping from one broiling-chamber within certain limits, or to cause said mixture to be consumed only in the fire-chambers nearest to the broiling-chamber whence it came, to secure the best results when only one or two or less than all of the broiling-chambers are in use. This subdivision is well effected by a series of flanges or partitions h , which extend between the plate G and the rear wall of the casing from top to bottom of the passage H. As there is always one more burner-chamber than there are broiling-chambers in the apparatus, the hot air and fatty-fume mixture from one of the broiling-chambers will be conducted to two fire-chambers, while this mixture from every other broiling-chamber will pass to but one burner and fire-chamber, the burner or burners of which are of sufficient capacity to assure combustion of the mixture to the best advantage. The location of the partitions h relatively to the broiling-chamber outlets g and fire-chamber inlets g' of the plate G is shown in Fig. 3 of the drawings. Not quite all of the fatty fumes will pass rearward with the air drawn through the broiling-chambers and thence to the fire-chambers, as above described, as a comparatively small volume of the fumes will es-

cape at the front of the broiling chamber or chambers. I dispose of these latter fumes by providing a hood M at the front of the broiler and a series of the above-named fume-conduits I, which are arranged one above each broiling-chamber and are open at both ends, one end of each conduit communicating with the hood M and its other end discharging the fatty fumes drawn rearward from beneath the hood into the flue-outlet K of the apparatus. These interior conduits I, which extend across the upper hot-product chamber J, are shown in Fig. 4 of the drawings as made of a single piece of sheet metal turned or bent upward and inward at the ends, which are seamed together along the top, while their laterally-projected rear end flanges *i* are riveted to each other and to the rear wall of the casing, the contracted outlets *k* being made in or through both flanges and wall. (See Fig. 7 of the drawings.)

A special feature of construction consists in the extension of the front doors A² of the broiling-chamber A upwardly sufficiently far to cause them to close the front ends of the conduits I, as they close the fronts of the broiling-chambers, as shown in Fig. 5 of the drawings. With this arrangement, when the broiling chamber or chambers not in use are closed at the front by corresponding doors A², said doors also closing the conduits I above these unused chambers, will prevent rearward draft through said chambers and conduits and facilitate a better draft through the other chamber or chambers which are in use and the conduits over them. It will also be noticed that by closing the doors of the unused broiling-chambers, and therefore also closing the conduits above said chambers, the fumes escaping at the front of the used broiling-chambers are excluded from the unused chambers and the conduits above them. Hence said fumes cannot permeate other portions of the apparatus, but will be swept rearward from the hood M by and with the increased draft of air through the open conduit or conduits over the broiling chamber or chambers in use.

A pipe N, which extends along the front of the upper hot-product chamber J, and thence rearward at both ends through the rear wall of the main casing C for pipe connections to a circulating-boiler (not shown) of any approved construction, provides an effective water-back device, which is economically heated by waste hot products from the fire-chambers B before the products take final exit from the apparatus. This pipe water-back is sustained partly or along its front portion by or from the fume-conduits I. (See Figs. 5 and 6 of the drawings.)

An important feature of this invention consists in the use of a heat distributing and radiating plate or body in the intermediate fire-chambers of the broiler apparatus, or those fire-chambers receiving hot products from one source of heat and having opposing side walls

forming cooking walls or plates of two adjacent independent broiling-chambers. This heat distributing and radiating plate consists, preferably, of a slab or piece O, of soapstone or fire-brick or other refractory material, which is held centrally edgewise between the two adjacent cooking-walls *a a* of two independent broiling-chambers A A. I prefer to sustain the slab or plate O by shoulders *o* of it resting upon corresponding shoulders of vertically-ranging front and rear soapstone or fire-brick or other refractory slabs or plates P P, which are sustained next the front wall of the casing and the rear partition-plate G of the apparatus. These plates P are centrally grooved at *p* to receive the edges of the heat distributor or radiator O, which is slipped downward into the grooves after the plates P are in position. A cap piece or plate *o'* may or may not be secured across the casing above the parts O P P to hold them down to promote safety during transportation. The lower portion of the heat distributor and radiator O is preferably tapered downward to present a comparatively thin edge to the flame rising from the burner E below it or from any other source of heat in the fire-chamber. The plate O is also preferably perforated with a series of holes *o'*, which increase its heat-radiating function. These holes may be substituted by pockets or recesses or corrugations of any suitable character, as instanced by the center plate in Fig. 7 of the drawings, the object being to obtain as large a heat-radiating surface as possible. It is manifest that the hot products rising from the burner E or other source of heat in any one of the intermediate fire-chambers will on striking the lower edge of the plate O be deflected or distributed to both sides of the plate and will be led upward quite closely to the adjacent cooking-walls *a a* to heat both of them evenly and effectively, and the heat taken up by the plate and radiated therefrom to the cooking-walls very materially assists in keeping them at proper temperature. I find in practice that by using this heat distributor and radiator, as above described, a very marked economy in consumption of gaseous fuel is assured, as two cooking-walls of two adjacent but independent broiling-chambers can be heated with but one-third more gas than is required to heat but one cooking-wall, the outside cooking-wall of the end broiling-chambers, for instance.

It will be understood that these heat distributors and radiators give specially good results when used in combination with fluid-fuel burners which flame with concentrated heating effect directly against their lower edges. Hence I hereinafter specially claim the heat distributors and burners in this mutual relation. It is further obvious that these heat distributors and radiators are not limited in use to the multiple-broiler apparatus herein shown and described. Hence they may be

used in the multiple-broiler apparatus shown in the above-named concurrent applications and with very advantageous results. I also find it desirable in practice to corrugate the opposing or inner faces of the cooking-walls *a* of the broiling-chambers. These corrugations may extend in any or all directions across the surface of the plate; but I prefer at present to corrugate the plate vertically, as shown at the right hand in Fig. 7 of the drawings, and to make the plate quite thin, so that these corrugations appear alike at both its outer and inner faces. These facial corrugations give the plate a larger heating and radiating surface and also provide for taking up expansion of the plate within itself or prevent lengthening of the plate, as it is gradually heated to a proper temperature, and preferably to a dull-red color. This corrugated cooking plate or wall may or may not be provided with a laterally-extending front flange to lap onto the front of the casing *E*, and when the plate is to be used for a broiling-chamber, having sufficient height to accommodate two grids *L*, one above the other, said cooking plates or walls will have two inwardly-extending flanges *a*³ *a*³, on which the grids will be sustained centrally within the broiling-chamber by lateral projections resting on the flanges. These flanges *a*³ may be cast directly on the plate or may be secured thereto in any approved manner.

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

1. The combination, in a broiling apparatus, of a casing or frame, a series of food-broiling and air-superheating chambers *A* and adjacent fire-chambers *B* therein, and a rear partition *G* in the casing, having upper openings *g* and lower openings *g'* and providing a passage *H*, giving indirect communication between the broiling and fire chambers, substantially as described.

2. The combination, in a broiling apparatus, of a casing or frame, a series of food-broiling and air-superheating chambers *A* and adjacent fire-chambers *B* therein, and a rear partition *G* in the casing, having upper openings *g* and lower openings *g'* and providing a passage *H*, giving indirect communication between the broiling and fire chambers, said passage being fitted with partitions apportioning the hot air and fatty-fume mixture from the broiling-chambers to the adjacent fire-chambers, substantially as described.

3. The combination, in a broiling apparatus, of a casing or frame, a series of food-broiling and air-superheating chambers *A* and adjacent fire-chambers *B* therein, chambers *A'* below the chambers *A*, chambers *D* below the chambers *B*, and fluid-fuel burners in the chambers *D* and provided at their mixing-tubes and outside the burner or fire chambers with air-inlets, a partition *G* in the casing, provided with openings *g g'* and forming a passage *H*, giving indirect communication be-

tween the broiling and fire chambers, an upper hot-product chamber *J* being provided in the casing, conduits *I* in said chamber *J*, and final outlets, as at *k K*, from this chamber for the hot waste products, substantially as described.

4. The combination, in a broiling apparatus, of a casing or frame, a series of food-broiling and air-superheating chambers *A* and adjacent fire-chambers *B* therein, chambers *A'* below the chambers *A*, chambers *D* below the chambers *B*, fluid-fuel burners in the chambers *D* and provided at their mixing-tubes and outside the burner or fire chambers with air-inlets, a partition *G* in the casing, provided with openings *g g'* and forming a passage *H*, giving indirect communication between the broiling and fire chambers, an upper hot-product chamber *J* being provided in the casing, conduits *I* in said chamber *J*, final outlets, as at *k K*, from this chamber for the hot-waste products, and a hood *M* in front of the conduits *I*, substantially as described.

5. The combination, in a broiling apparatus, of a casing or frame, a series of broiling-chambers *A* and fire-chambers *B* therein, chambers *A'* below the chambers *A*, chambers *D* below the chambers *B*, fluid-fuel burners in the chambers *D*, said casing having a front portion *c'*, sustaining the burner-fittings, and a removable or operable front portion *c*², giving access to the burners, substantially as described.

6. A broiling apparatus made with two or more broiling-chambers, fire-chambers at the sides thereof and with which the broiling-chambers indirectly communicate, fatty-fume conduits above the broiling-chambers, and doors fitted to the broiling-chambers and extended to close the fume-conduits, substantially as described, whereby when the doors of the unused broiling-chambers are closed the corresponding fume-conduits will also be closed to increase the draft through the broiling and fire chambers and the respective conduits in use and exclude the fatty fumes from unused parts of the apparatus, as herein set forth.

7. A broiling apparatus made with two or more broiling-chambers, fire-chambers at the sides thereof, and heat-radiating deflectors in the intermediate fire chamber or chambers distributing the flame or heat toward cooking-walls of two adjacent broiling-chambers, substantially as described.

8. A broiling apparatus made with two or more broiling-chambers, fire-chambers at the sides thereof, fluid-fuel burners adapted to flame into said fire-chambers, and heat-radiating deflectors in the intermediate fire-chambers above the burners and distributing their flames or heat toward cooking-walls of two adjacent broiling-chambers, substantially as described.

9. A broiling apparatus made with two or more broiling-chambers, fire-chambers at the sides thereof, and heat-radiating deflectors in

the intermediate fire-chambers, provided with downwardly-tapering lower parts presented edgewise to the source of heat in the fire-chambers and distributing the flame or heat toward cooking-walls of two adjacent broiling-chambers, substantially as described.

10. A broiling apparatus made with two or more broiling-chambers, fire-chambers at the sides thereof, and heat-deflectors in the intermediate fire-chambers distributing the flame or heat toward cooking-walls of two adjacent broiling-chambers, said deflectors having lateral or facial perforations or corrugations, substantially as described.

11. A broiling apparatus made with a casing or frame, two or more broiling-chambers therein, fire-chambers at the sides of the broiling-chambers, said broiling-chambers communicating indirectly with the fire-chambers which consume fatty fumes from the food, and heat-radiating deflectors in the intermediate fire-chambers distributing the flame or heat from the consuming hot air and fatty-fume mixture toward cooking-walls of

two adjacent broiling-chambers, substantially as described.

12. The combination, in a broiling apparatus, of a series of broiling-chambers, fire-chambers at the sides thereof, sources of heat in the fire-chambers, front and rear supports in the intermediate fire-chambers, and heat-radiating deflecting-plates fitted to slide in the supports and sustained edgewise by them between opposing cooking-walls of adjacent broiling-chambers, substantially as described.

13. The combination, in a broiling apparatus and with a series of adjacent broiling-chambers and fire-chambers between them, of heat-radiating deflectors O, having shoulders o and lateral or facial perforations or corrugations, and grooved and shouldered front and rear plates P, sustaining the deflectors within the intermediate fire-chambers, substantially as described.

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