Dec. 31, 1946. R. J. GREENE 2,413,447

RADIANT OVEN AND BROILER BURNER

Filed Oct. 21, 1943 4 Sheets-Sheet 1

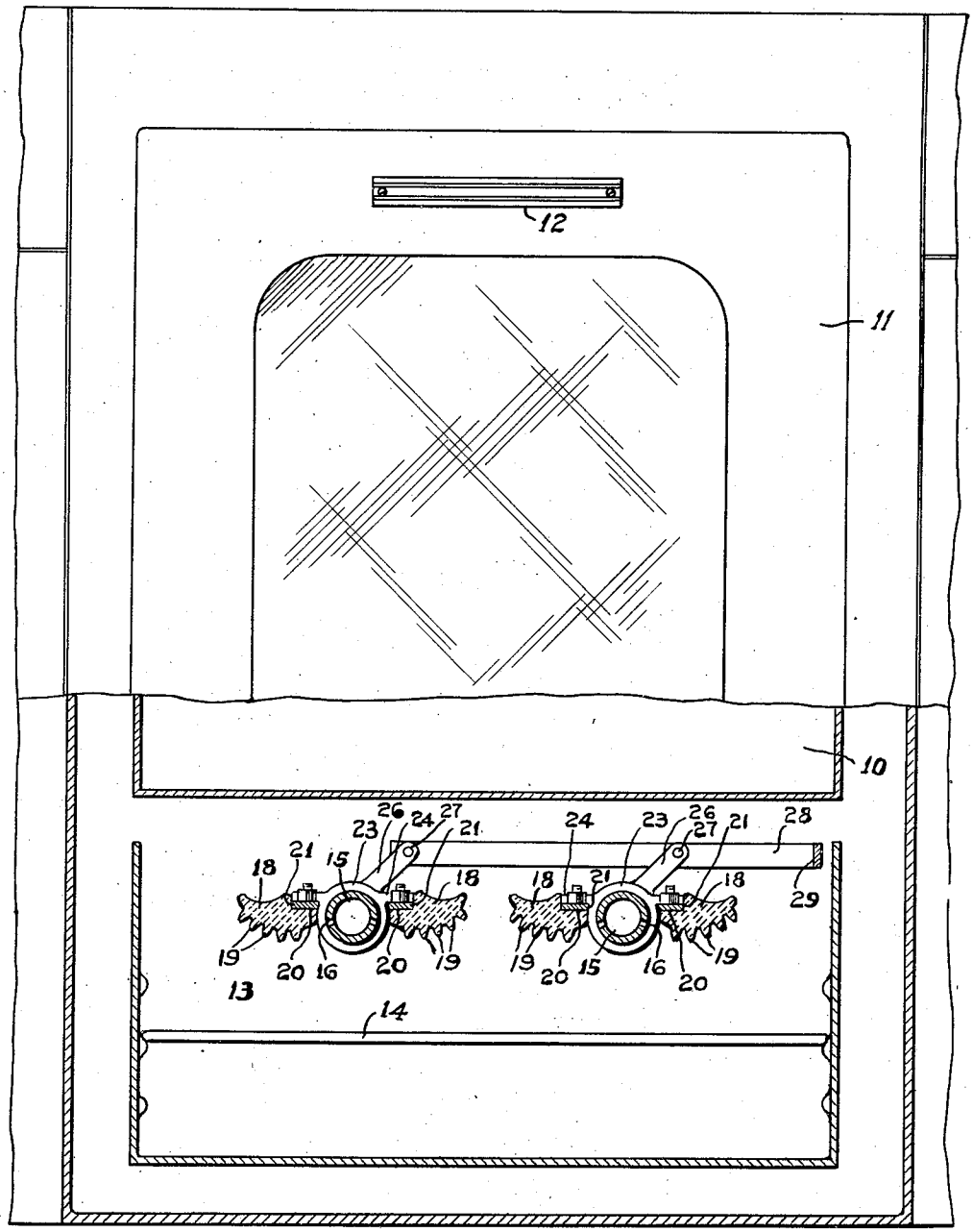

Fig. 1

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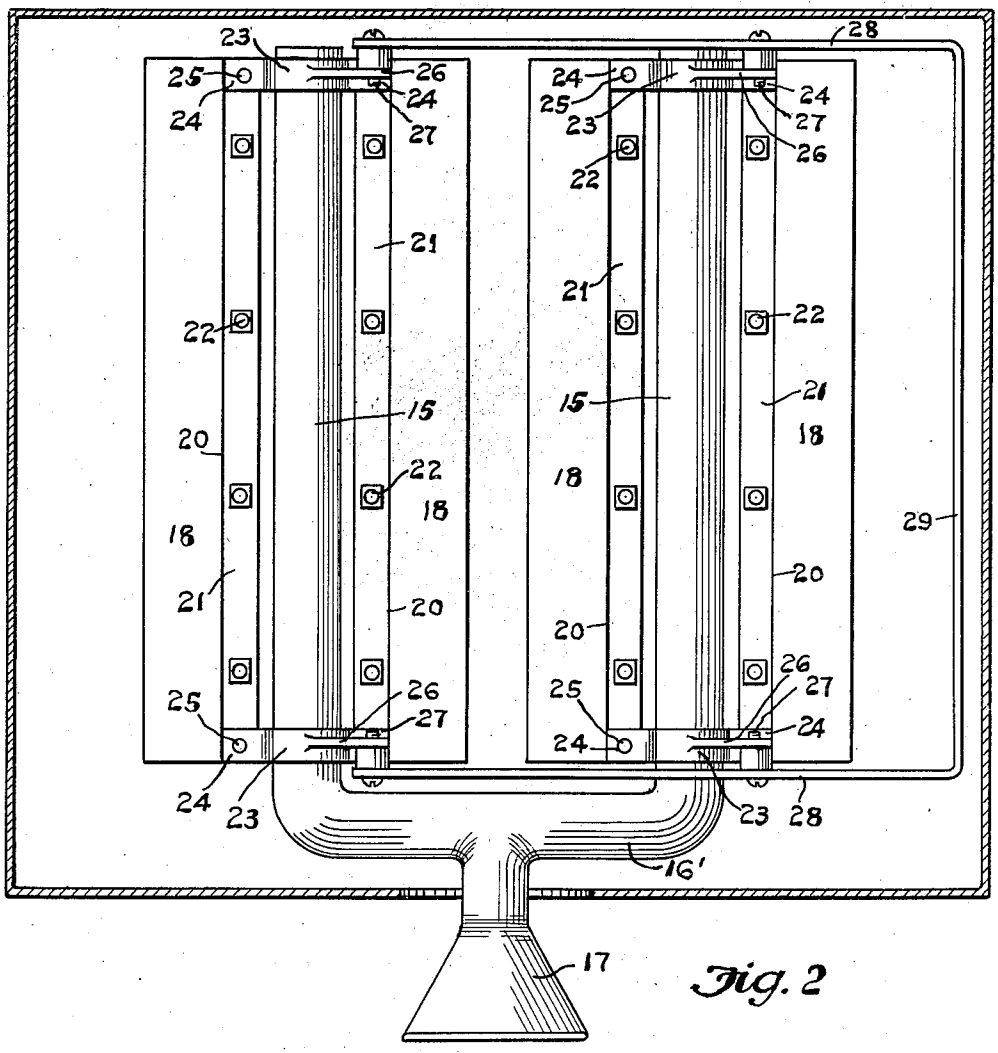

Fig. 2

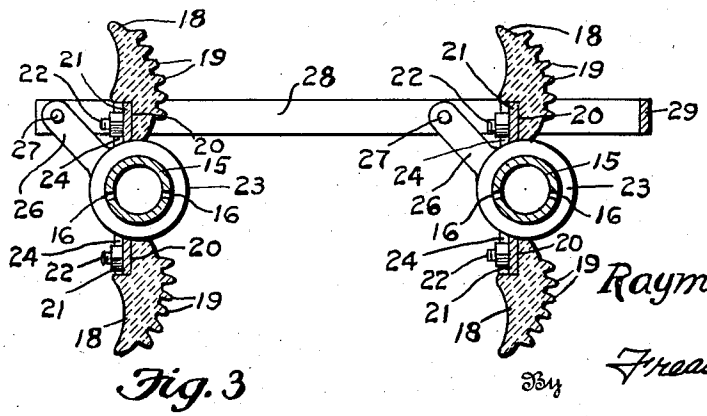

Fig. 3

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RADIANT OVEN AND BROILER BURNER

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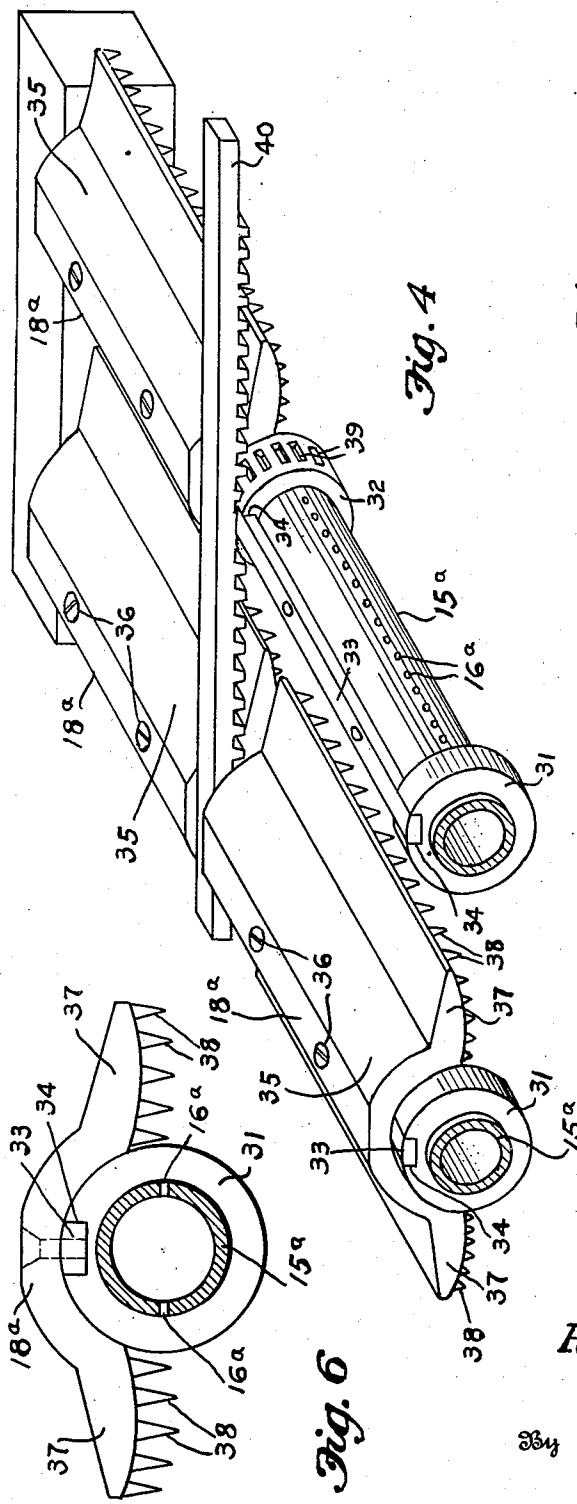

Fig. 4

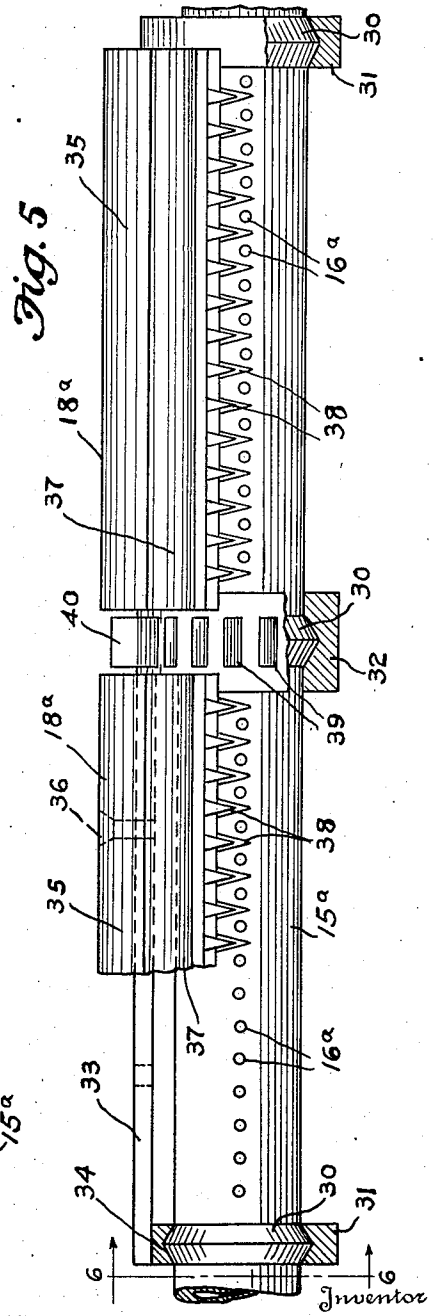

Fig. 5

Fig. 6

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Fig. 7

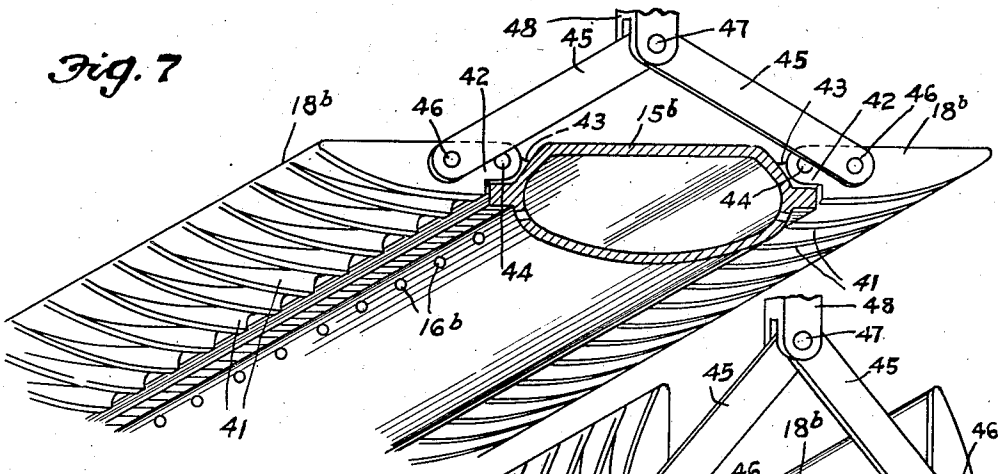


Fig. 8

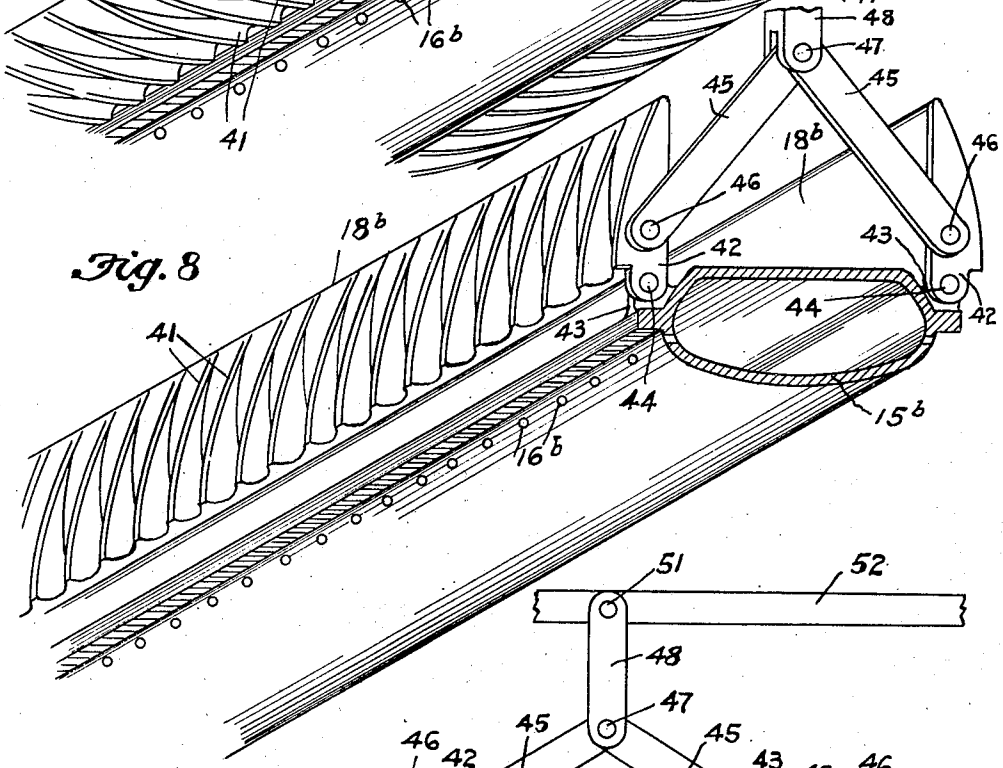
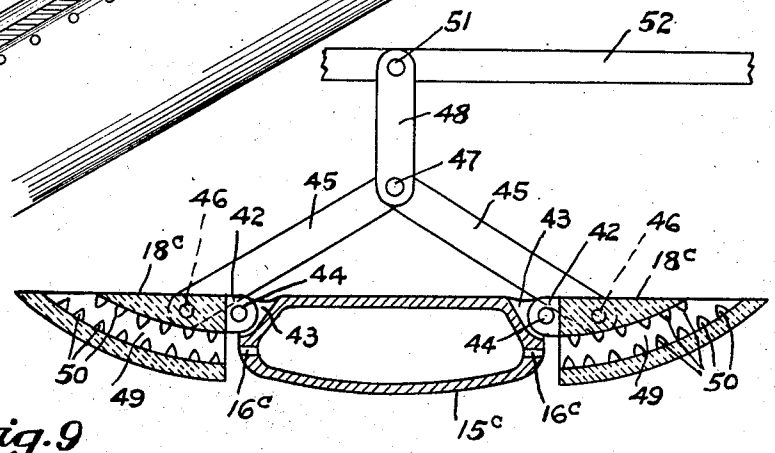


Fig. 9



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RADIANT OVEN AND BROILER BURNER

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Application October 21, 1943, Serial No. 507,082

14 Claims. (Cl. 158—113)

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The invention relates to a broiler and oven burner for cooking stoves in which gas is used for fuel, and more particularly to a burner of this type having ceramic or other radiants mounted thereon.

Cooking stoves of the general type referred to have in the past been provided with a single burner for heating both the oven and the broiler. Such burners were designed primarily to heat the oven while the broiler is more or less of an auxiliary thereto, and while the same burner is used for heating both the oven and the broiler, the burner is not so constructed that the maximum heating of either the oven or broiler is obtained. In the ordinary burner used for ovens and broilers, the flames are discharged at the lower opposite sides of one or more burner pipes, the flames being independent of each other and the heating of the oven and broiler being accomplished solely by the heat developed by the flames.

Efforts have been made to produce a radiant heater for ovens and broilers but such attempts have consisted in mounting a substantially U-shaped ceramic radiant over the top and sides of the burner pipe in order to produce a blanket of heat in the broiler, above the food to be broiled. Such devices, while increasing the efficiency of the burner for broiling, decrease its efficiency for heating the oven.

The object of the present invention is to provide a single burner for selectively heating either the oven or the broiler, provided with radiants adjustable to produce radiant heat in the broiler or circulating heat in the oven as desired.

Another object is to provide a burner having burner pipes upon which are mounted radiants adapted to be moved into substantially horizontal position at the sides of the pipes so as to produce substantially horizontal blanket of radiated heat in the broiler and directly above the food to be broiled, means being provided for quickly and easily adjusting the radiants to vertical position so that at least one radiant upon each burner pipe extends upwardly above the pipe, increasing the heating effect in the oven by a combination of radiated heat and circulating heat.

A further object is to provide a burner of this type in which a radiant is pivotally or hingedly mounted at each side of a burner pipe, means being provided for simultaneously moving both of the radiants to either horizontal or vertical position as may be desired to develop the maximum heating effect of the burners in either the broiler or the oven.

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A still further object of the invention is the provision of a combined oven and broiler burner in which two or more substantially parallel burner pipes are provided, radiants being adjustably associated with each burner pipe and means being operatively associated with all of the radiants for simultaneously moving all of the radiants to vertical or horizontal position as may be required for heating the oven or broiler.

Together with the above objects, still other objects and advantages of the improvement which will be apparent from an inspection of the drawings and the following description, may be attained by constructing the improved radiant burner in the manner illustrated in the accompanying drawings, in which—

Figure 1 is a sectional elevation of the front of the oven and broiler of a conventional gas range, showing the usual spaced, horizontal burner pipes located between the oven and broiler, ceramic radiants being pivotally mounted upon the burner pipes and adjusted to horizontal position for directing the maximum heat from the burners downward into the broiler;

Fig. 2, a top plan view of the burner pipes and radiants, in the position shown in Fig. 1, and upon a somewhat larger scale;

Fig. 3, a vertical, transverse section through the burner pipes and radiants, showing the radiants adjusted to vertical position for directing the maximum heat upward into the oven;

Fig. 4, a perspective view of a slightly modified form of burner in which the radiants are adjusted around the burner pipes by means of rack and pinion gearing;

Fig. 5, a side elevation of the burner shown in Fig. 4, on a slightly larger scale, with parts broken away for the purpose of illustration;

Fig. 6, a transverse section of the burner, taken as on the line 6—6, Fig. 5;

Fig. 7, a perspective view of another modification of the burner, in which a ceramic radiant is hingedly mounted at each side of the burner pipe and means provided for simultaneously moving both radiants to horizontal or vertical position, the radiants being shown in horizontal position in said view;

Fig. 8, a view similar to Fig. 7, showing the ceramic radiants both adjusted to vertical position; and

Fig. 9, a transverse sectional view through the burner in the adjusted position shown in Fig. 7 and showing another form of radiant.

Similar numerals refer to similar parts throughout the several views of the drawings.

The invention contemplates the installation of ceramic or other radiants as an addition to the usual burner pipes, for diffusing and diverting the flames so that the radiants are quickly heated, causing a considerable temperature increase over the ordinary method. With such a construction, a large proportion of the heat of the flames which ordinarily escapes rapidly is used in heating the radiants so as to radiate a considerable amount of heat therefrom whereby food may be cooked more rapidly and a much more economical use of fuel is obtained.

The invention further contemplates the adjustment of the radiants from a substantially horizontal position to a substantially vertical position whereby the considerable heat radiated from the radiants may be directed downward into the broiler or upward into the oven for circulation therein, as desired.

As shown in the drawings, the invention is applicable to any usual form of burner such as is now commonly used in ovens and broilers, in which one or more substantially horizontal fuel pipes is provided having openings along its lower opposite sides from which the flames are discharged.

Referring first more specifically to the form of the invention shown in Figs. 1 to 3 inclusive, a portion of a conventional gas range is illustrated in Fig. 1, in which the oven is indicated generally at **10**, arranged to be normally closed by the usual door **11** provided with the ordinary handle **12** for operating the door.

The broiler is indicated generally at **13**, and may be provided with the usual shelf or broiler tray **14** arranged to be adjustably mounted in the broiler relative to the burners. All of these parts may be of any usual and well known construction and arrangement and in themselves form no part of the instant invention which is concerned with the hereinafter described construction and arrangement of the burner which is located in conventional manner between the oven and the broiler.

As shown in Figs. 1 to 3 inclusive, the burner may be of the ordinary horseshoe or U-shape type in which two spaced, horizontal, parallel fuel pipes **15**, each having the usual flame apertures or jets **16** formed in rows at each side of the pipe, are connected at one end to the manifold pipe **16'** provided with the usual air mixer **17** and communicating with the usual gas supply through a valve (not shown) all in usual and common practice.

It should be understood that while one common form of oven burner is illustrated in Figs. 1 to 3 inclusive, that the invention may be applied to any of the several common forms of oven burners now in general use, having one or more straight fuel pipes communicating with a gas and air supply in any usual and well known manner, the invention residing in the construction and arrangement of the radiants which may be applied to the straight fuel pipes in the same manner in all forms of burner pipes.

Again referring to Figs. 1 to 3 inclusive of the drawings, the burner including the straight fuel pipes **15**, is located as in usual practice in the upper portion of the broiler compartment **13** of the range and below the usual oven **10**.

To this usual and ordinary construction of oven burner the present invention adds the radiants **18**, which may be of any usual and well known design of radiants, of ceramic, metal or other material, at diametrically opposite sides of each fuel pipe **15**, these radiants being adjustably mounted relative to the burner pipes so that they may be moved into horizontal position at each side of the pipes as shown in Figs. 1 and 2 in order to radiate the maximum amount of heat downwardly into the broiler, or they may be swung into substantially vertical position as shown in Fig. 3 for heating the oven.

For the purpose of illustration, ceramic radiants are shown, and, although the cross sectional shape of these ceramic radiants may vary considerably, as in usual practice, the form of radiant illustrated in these views is one in which the underside of each radiant, as viewed in Figure 1, is convex and provided with a plurality of conical projections **19**, this being a very common type of radiant. The upper surface of each radiant may be recessed along the edge toward the fuel pipe, as indicated at **20** to accommodate a metal bar **21** secured to the ceramic radiant as by bolts **22**.

A ring **23** is journalled upon each end portion of each of the pipes **15** and provided with oppositely disposed lugs **24** which may be rigidly connected to the metal bars **21** as by the screws or rivets **25**. With this construction it will be seen that each pair of ceramic radiants **18** is pivotally or hingedly mounted upon the corresponding fuel pipe **15** so that the pair of radiants as a unit may be rotated around said pipe to different radial positions.

For the purpose of rotating the rings **23** upon the several pipes **15** in unison, so as to simultaneously adjust all of the radiants to horizontal position as shown in Figs. 1 and 2, or vertical position as shown in Figure 3, an arm **26** may be formed upon or rigidly connected to each ring and pivotally connected as at **27** to one of the cross bars **28** of the U-shape operating frame **29**.

As shown in Figs. 1 and 3 each of the radiant tiles **18** may be tapered away from the adjacent burner pipe so that it is thinner at its outer edge than at its inner portion in order to heat up or become radiant more quickly. It will also be evident from an inspection of the drawings that the rings **23** space the radiants sufficiently from the burner pipes to permit an air space around the pipes so that even though the radiants become heated to an extremely high degree the pipes may remain relatively cool by the passage of fuel therethrough and the air space therearound.

In actual use it has been found that these ceramic radiants are quickly heated and when placed in the horizontal position as shown in Figs. 1 and 2 the burning fuel forms a radial bracket which retains the heat and reaches a temperature several hundred degrees higher than is possible with the ordinary form of burner pipe, this heat being directed downward upon the food in the boiler.

When it is desired to obtain the maximum heat in the oven rather than in the broiler, the ceramic radiants are adjusted to substantially vertical position as shown in Figure 3, whereby the oven receives not only the full heat of the burner pipes as in ordinary practice, but also considerable additional heat radiated from at least the upper radiant of each burner pipe.

In the modification shown in Figs. 4 to 6 inclusive, the straight fuel pipes are provided along each side with the flame apertures or jets **16a**, arranged in longitudinal rows, as in usual and well known practice. Substantially V-shape journal portions **30** may be formed at intervals upon the pipes for rotatably mounting

the bearing rings 31 which adjustably support the radiants as will be later described in detail.

Bars 33 are fitted into notches 34 in the peripheral portions of the bearing rings 31 and 32, and may be rigidly connected to the rings in any usual and well known manner, such for instance as welding, thus forming frames, rotatable upon the pipes, for adjustably supporting the ceramic radiants, indicated generally at 18a.

Each radiant includes a semi-cylindric portion 35, the ends of which partially surround the bearing rings 31 and 32, and the longitudinal central part of which is fixedly connected to the bar 33 as by the screws or rivets 36.

Radial wings 37 are formed at opposite sides of the curved body portion of each radiant, these wings being preferably tapered toward their outer edges, as best shown in Figs. 5 and 6, and having the convex undersurfaces provided with a multiplicity of conical projections 38.

For the purpose of rotating all of the radiants around the pipes in unison, so as to move the radiants from the horizontal position as shown in Figs. 4 to 6, to a vertical position, rack and pinion gearing is provided. This gearing comprises the gear teeth 39 formed in the bearing rings 32, converting said bearing rings into pinions, and the rack bar 40 meshing with the pinions thus formed.

In Figs. 7 and 8 is shown another modification of the invention in which radiants are independently hinged or pivoted at opposite side portions of each burner pipe so that both radiants may be swung upward to vertical position to greatly increase the heating of the oven.

The burner pipes in this form of the invention are indicated at 15b, and are provided along opposite sides with straight rows of flame apertures or jets. The ceramic radiants, indicated generally at 18b, are independently hinged at opposite sides of the burner pipe.

These radiants are preferably tapered toward their outer edges and provided with convex undersurfaces, and may be of the general type hereinbefore described and illustrated, or of any other usual and well known type of radiant, such as the transversely ribbed radiants shown in Figs. 7 and 8, in which a plurality of transversely disposed, convex ribs 41 may be formed upon the underside of each radiant in order to heat up and become radiant more quickly.

For the purpose of hingedly attaching the radiants to the pipe ears 42, preferably of metal, are fixed to the ends of the radiants and are pivotally connected to the lugs 43 by means of the pins 44, so that the radiants may be moved from the horizontal position shown in Fig. 7 to the vertical position of Fig. 8 so as to direct the maximum heat of the burners downward into the broiler or upward into the oven respectively.

In order to operate both radiants in unison, links 45 are pivotally connected at their lower ends to the end portions of the radiants, as at 46, and their upper ends are pivoted, as at 47, to the link 48.

Various types of ceramic radiants may be used in this form of the invention as well as in the other forms hereinbefore described. By way of illustration in Fig. 9 is shown a pair of hollow radiants 18c, preferably tapered toward their outer edges and having convex undersurfaces.

These radiants are connected to opposite sides of the gas pipe 15c by means of the ears 42, lugs 43 and pins 44, in the same manner as illustrated and described in Figs. 7 and 8, and the linkage

operatively connecting the radiants is the same as shown in said Figs. 7 and 8 and is designated by the same reference numerals.

Each radiant 18c may have a transversely arcuate, longitudinal slot 49 therethrough, the inner end of the slot registering with the flame apertures 16c of the burner pipe. The usual conical projections 50 may be formed upon the inner walls of the slot 49 if desired.

For the purpose of simultaneously operating the radiants upon two or more pipes, the links 48 of adjacent burners may be pivotally connected, as at 51, to an operating link or lever 52.

I claim:

1. An oven and broiler burner including a stationary fuel pipe having flame jets in opposite sides thereof, a pair of radiants adjustably mounted upon and parallel to the pipe, and means for moving said radiants relative to the fuel pipe to horizontal positions at each side of the pipe and to vertical positions adjacent to the pipe.

2. An oven and broiler burner including a stationary fuel pipe having flame jets in opposite sides thereof, a pair of radiants adjustably mounted upon and parallel to the pipe, and means for moving said radiants to horizontal positions at each side of the pipe in line with the flame jets and to vertical positions above the pipe, and above the flame jets.

3. An oven and broiler burner including a stationary fuel pipe having flame jets in opposite sides thereof, a pair of radiants adjustably mounted upon and parallel to the pipe, and means for moving said radiants relative to the full pipe to positions at each side of the pipe and to positions above and below the pipe.

4. An oven and broiler burner including a plurality of stationary fuel pipes having flame jets in opposite sides thereof, radiants pivotally mounted upon the pipes, and means for adjusting the radiants to horizontal positions between the pipes and to vertical position adjacent to the pipe.

5. An oven and broiler burner including a plurality of stationary fuel pipes having flame jets in opposite sides thereof, radiants pivotally mounted upon the pipes, and means for adjusting the radiants to horizontal positions between the pipes and to vertical position above the pipe.

6. An oven and broiler burner including a plurality of parallel stationary fuel pipes having flame jets in opposite sides thereof, radiants journaled upon the pipes, and means for adjusting the radiants to horizontal position between the pipes and to vertical position above and below the pipes.

7. An oven and broiler burner including a plurality of stationary fuel pipes having flame jets in opposite sides thereof, radiants pivotally mounted upon the pipes, and link and lever means for adjusting the radiants to horizontal positions between the pipes and to vertical position adjacent to the pipe.

8. An oven and broiler burner including a plurality of stationary fuel pipes having flame jets in opposite sides thereof, radiants pivotally mounted upon the pipes, and rack and pinion means for adjusting the radiants to horizontal positions between the pipes and to vertical position adjacent to the pipe.

9. An oven and broiler burner including a stationary fuel pipe having flame jets in opposite sides thereof, a pair of radiants adjustably mounted upon and parallel to the pipe, and link and

lever means for moving said radiants to horizontal positions at each side of the pipe and to vertical positions adjacent to the pipe.

10. An oven and broiler burner including a stationary fuel pipe having flame jets in opposite sides thereof, a pair of radiants adjustably mounted upon and parallel to the pipe, and rack and pinion means for moving said radiants to horizontal positions at each side of the pipe and to vertical positions adjacent to the pipe.

11. An oven and broiler burner including a stationary fuel pipe having flame jets in opposite sides thereof, a ring journaled upon the pipe, radiants fixed to opposite sides of the ring, and means for rotating the ring upon the pipe so as to locate one radiant upon each side of the pipe, or so as to locate one radiant above the pipe and the other radiant below the pipe.

12. An oven and broiler burner for heating an oven and a broiler located beneath the oven, said burner including a stationary fuel pipe located in the upper portion of the broiler compartment and having flame jets in opposite sides thereof, a

radiant adjustably mounted relative to the pipe, and means for positioning said radiant at one side of the pipe in substantially the same horizontal plane as the pipe, or above the pipe in substantially the same vertical plane as the pipe.

13. An oven and broiler burner including a stationary fuel pipe having flame jets in opposite sides thereof, a ring journaled upon each end portion of the pipe, lugs upon opposite sides of the rings, a radiant fixed to the lugs on each side of the ring, and means for rotating said rings upon the pipe to position the radiants in a substantially horizontal plane at opposite sides of the pipe, or to position the radiants in a substantially vertical plane above and below the pipe.

14. An oven and broiler burner including a plurality of parallel stationary fuel pipes having flame jets in opposite sides thereof, rings journaled upon the end portions of the pipes, radiants fixed to each ring, and means operatively associated with the rings for adjusting the radiants to horizontal or vertical position.

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