Dec. 5, 1939. H. W. O'DOWD 2,182,734

GAS STOVE

Filed June 24, 1936 2 Sheets-Sheet 1

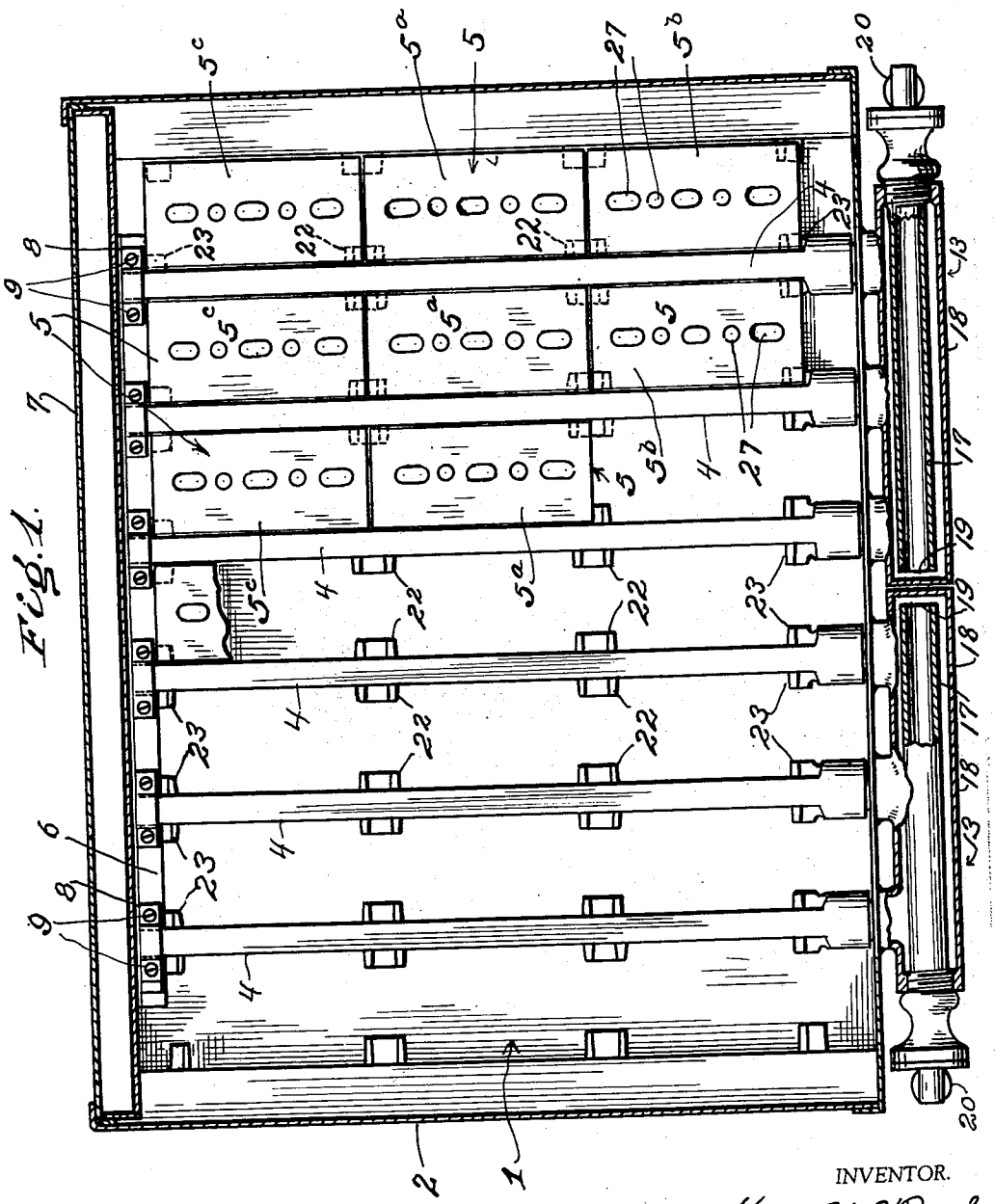


Fig. 1.

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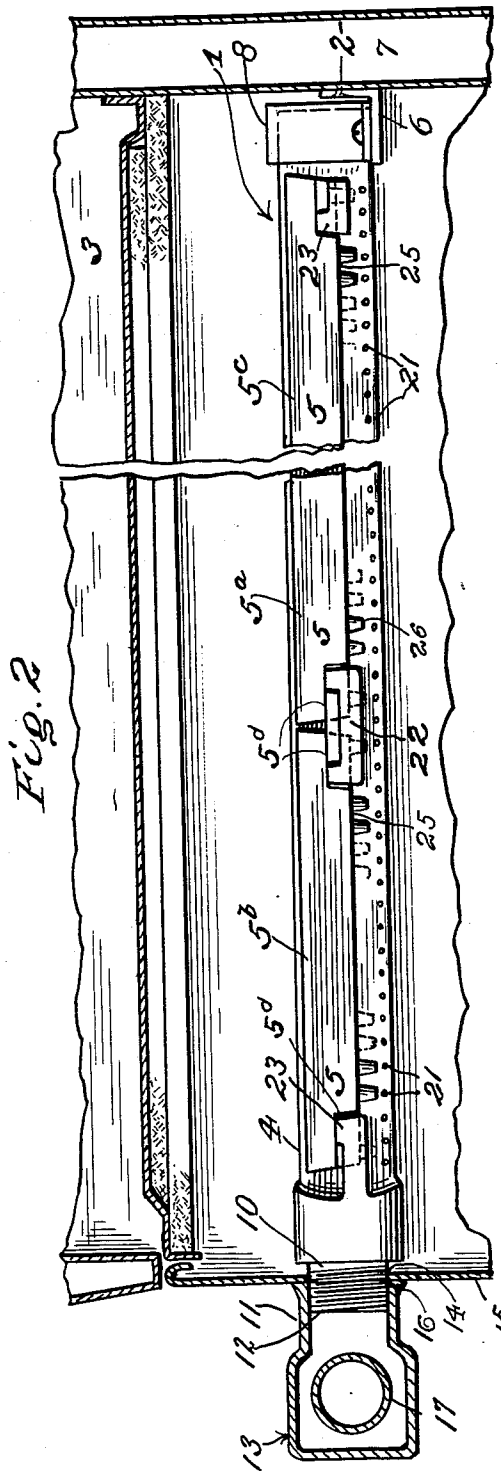


Fig. 2

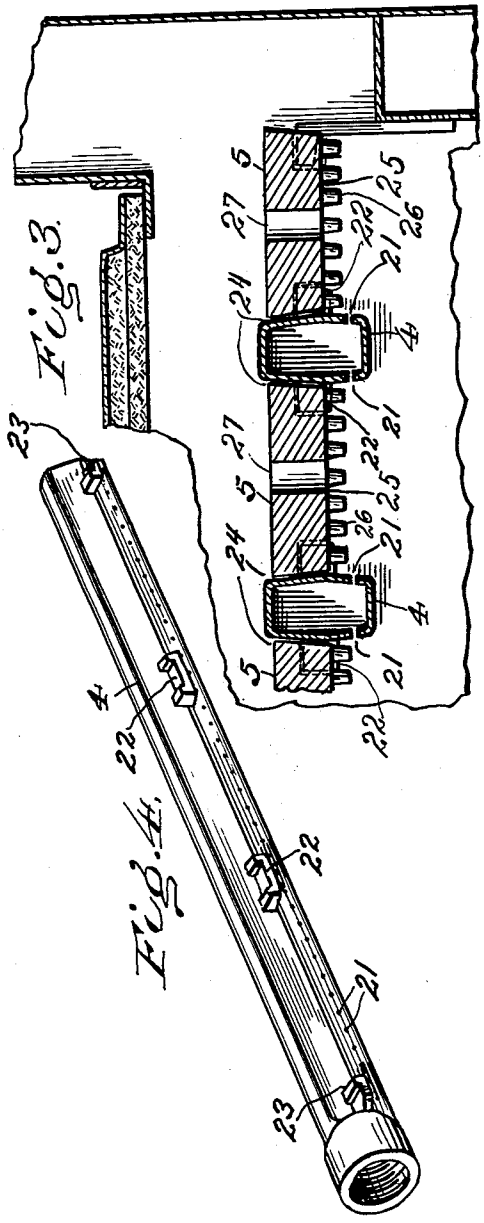


Fig. 3

Fig. 4

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GAS STOVE

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3 Claims. (Cl. 126—41)

This invention relates generally to gas stoves, and more particularly to broiling units wherein the foodstuff to be broiled or toasted is placed upon a slidable vertically adjustable grill and presented at the desired level below a burner or series of burners whose flames are directed downwardly toward the article or articles of food to be cooked.

In these broiler units, it is common practise to employ some form of heat radiant arranged above the flame ports of the burner or burners to radiate the heat downwardly toward the broiler grill in order to obtain a more intense heat concentrated more uniformly thereover; and many advantages are derived therefrom, since the cooking time is lessened with a consequent saving of fuel, the cooking is more uniformly accomplished, and because the heat is radiated at a high intensity the cooking may be done at a safe distance below the flames to prevent burning. Other advantages are well known to those familiar with the type of broiler referred to and need no elaboration.

The burners usually employed comprise tubes substantially circular in cross-section and formed with lateral flame ports; and the heat radiants are ordinarily made either of a fire clay composition and supported by the burners or of calorized wire gauze attached to the sides of the burners. Along with the advantages flowing from these arrangements, there are, however, many disadvantages and undesirable features. For example, one of the most pronounced disadvantages arises from the exposure of the greater portion of the tubular burners to the intense heat concentrated below them, and which in a short time causes them to warp to such extent that they must be replaced, for in warping they displace or break away from the radiants, rendering the latter inefficient, or sag and get out of alignment and fall away from their supports. If the radiants are very open or porous for the free passage of the products of combustion to the flue, the heat of the flames is, of course, less concentrated and intense as well as less uniformly radiated.

It is the object of the present invention to obviate these and other undesirable features and disadvantages and, to this end, the invention contemplates an improved construction and arrangement of parts whereby the heat radiant serves the two-fold purpose of radiating the heat of the flames uniformly and efficiently at a high intensity and also of insulating the burners from the intense heat of the flames. More specifically, the invention provides an improved burner which is non-circular in cross-section, with its major axis extending vertically, and which is formed with lateral flame ports near its lower edge to direct the flames horizontally. Two or more such burners are arranged side by side in horizontal alignment and freely support between them heat radiants whose lower surfaces lie immediately above the flame ports and which are formed to vent the products of combustion at points remote from the flame ports and substantially in registry with the tip ends of the burner flames, the arrangement permitting a maximum of heat radiation and yet practically complete insulation by the radiants of the major portions of the burners from the intense heat of the flames.

In the accompanying drawings, the invention has been shown merely by way of example and in preferred form and obviously many variations and modifications may be made therein which will still be comprised within its spirit. It is to be understood, therefore, that the invention is not limited to any specific form or embodiment except insofar as such limitations are specified in the appended claims.

Referring to the drawings:

Fig. 1 is a top plan view of the broiler unit, partly broken away and with some of the radiants being omitted to show the construction and arrangement of the parts;

Fig. 2 is a broken vertical section of the broiler unit, taken fore and aft;

Fig. 3 is an enlarged, fragmentary transverse section, showing the burners and the association of the radiants therewith; and

Fig. 4 is a perspective view of one of the burners.

Referring particularly to Figs. 1 and 2, the broiler unit 1 is arranged in the casing 2 of the stove below the oven 3, since it is common practise to employ the broiler burners for heating the oven. The broiler unit 1 comprises a series of burners or burner tubes 4 extending from the front to the rear of the casing 2 and supporting between them in free engagement therewith heat radiants 5 in the form of brick slabs of a fire clay composition. The rear ends of the burners 4 are supported on a ledge or angle bracket 6 secured to the rear wall 7 of the casing 2 and are held against lateral and rotary displacement thereon by straps 8 secured by stove bolts 9 to the ledge 6. The forward or front ends of the burners are formed to fit over and be supported by nipples 10, screwed into gas outlet tubes 11 threaded internally as at 12 for that purpose and which lead from the sides of twin manifolds or mixing chambers 13 arranged at the front of the

stove, the nipples 10 passing through openings 14 provided in the front wall 15 of the casing 2 and which openings are closed at the front by shoulders 16 formed on the nipples. In the embodiment shown, six burners 4 are employed and arranged side by side in the same horizontal plane, three burners feeding from each of the manifolds 13. The arrangement is such that all six burners may be employed at one time if necessary or, when desirable, either set of three burners fed by one manifold may be used alone. The particular form of manifolds employed extend across the face of the stove and each is formed of two tubes 17 and 18, the former fitted within the latter and being open at its distal end as at 19, whereby the gas entering from the main feed pipe (not shown), when the petcock 20 is turned on, and the air entrained thereby through a shutter surrounding the petcock are allowed ample opportunity to mix in passing through the inner tube 17 and back between the tubes 17 and 18 before escaping through the outlet tube 11 leading from the outer tube 18 to the burners 4.

Each burner 4 is non-circular in cross-section and, as best shown in Fig. 3 has its major axis extending vertically or at right angles to the lower surfaces of the heat radiants 5. Near its lower edge, the burner is provided on opposite sides with equally spaced flame ports 21, lying in a common horizontal plane and being of a definite uniform size. About midway up the sides of the burner, there are formed on each side thereof a centrally located pair of double angle supports 22 and near each end a single angle support 23 for sustaining a series of three heat radiants 5 between adjacent burners in free engagement with the supports and the sides of the burners, the radiant and burner walls being correspondingly inclined as at 24 (Fig. 3) to insure a nice fit between them. It is because a series of radiants is employed between adjacent burners instead of one long radiant (which could of course be used) that the double brackets 22 are provided, since they support the center radiant 5^a and the inner ends of the end radiants 5^b and 5^c, the outer ends of the two latter radiants being supported by the single end brackets 23.

As already stated, the radiants 5 are formed of a fire clay composition, fire clay, as is well known, being highly refractory and possessing good insulating qualities. In the present instance, the flat lower surface 25 of each radiant 5 is notched at each corner, as at 5^d, to accommodate the supports 22 and 23 and allow the radiant to extend well down the sides of the burners between which it is fitted; and on the surface 25 there are formed closely arranged small frusto-conical projections 26, whose lower ends lie in a common horizontal plane immediately above the flame ports 21 of the burners 4. These projections 26 present heat radiating surfaces of large areas and in breaking up the burner flames are very readily brought to a point of incandescence; while the flat surfaces 25 from which they project deflect as well as radiate the heat downwardly toward the broiler grill. Along a median line, each radiant 5 is perforated throughout its length to form a plurality of vents 27 to carry off the products of combustion and the heat which accumulates in the broiler chamber. As shown, according to the preferred embodiment the vents 27 are alternately different in size, but it is pointed out that their form is more or less arbitrary as long as they provide passageways of sufficient area adequately to carry off the products of the combustion.

In operation, by virtue of the shape of the burners 4 and of the form and association of the radiants 5 therewith, the flames are directed laterally and horizontally from points very close to the lower edges of the burners to play directly on the projections 26 of the radiants; while the unabsorbed heat and products of combustion are immediately vented at points substantially in registry with the tip ends of the flames. With this arrangement, the projections 26 are constantly subjected to the full intensity of the heat of the flames and are not cooled because of any venting immediately above them and, hence, are brought rapidly to incandescence and maintained at a constant intensity of heat. The flat surfaces 25 of the radiants 5 direct the heat radiated by the projections 26 downwardly away from the burners and the indirect or rising heat is, of course, to a large extent entrained through the vents 27 and away from the lower edges of the burners 4. Thus the burners 4 are insulated and protected by the radiants 5 and remain relatively unaffected by either the direct or indirect heat of the flames, so that they will not be brought to red heat or to a temperature high enough to cause them to sag and warp. The angular formation of the supports 22 and 23 prevents their warping and dislocating the radiants 5; while the free engagement of the radiants with the supports and with the burners allows for whatever expansion and contraction of the parts may take place without damage thereto. Moreover, the utilization of a series of radiants between adjacent burners instead of a single long radiant lessens the tendency of the radiants to crack due to the effect of sudden changes in temperature on the parts, and in the event that one of them should become damaged, it can be replaced with very little difficulty or expense.

As already stated, the invention has been shown in its preferred embodiment and obviously variations thereof will suggest themselves to those skilled in the art which will still be comprised within its scope. For example, the radiants could be supported or sustained in free engagement with the burners by means other than supports on the burners themselves. Furthermore, although the burners have been described as arranged side by side in horizontal alignment and as being formed noncircular in cross-section with their major axes extending vertically, obviously the invention is not so limited and the directional expressions "vertically", "horizontally", etc., are used in the appended claims only in a relative sense, since the invention is applicable to gas stoves or heaters such as are commonly employed, for example, in non-wood burning fire-places or rotisserie ranges, wherein the burners are arranged in vertical alignment or in lateral alignment but with their major axes extending horizontally.

Having thus described my invention, what I claim is:

1. In a gas broiler, the combination of a series of burners arranged in the broiler compartment in parallel spaced relation and formed in their opposite sides below the center lines thereof with laterally directed flame ports arranged to project flames in opposite directions from one burner toward another, and a plurality of fire-brick slabs arranged above the level of the flame ports and closely fitted to the burners so as substantially to embed the burners therein, the fire-brick slabs

between each pair of burners being imperforate save for localized vents formed therein remote from both burners to permit the heat currents to pass through the slabs, whereby the fire-brick slabs serve the two-fold purpose of radiating heat from the burner flames and shielding the burners from the heat of the flames.

2. In a gas broiler, the combination of a series of burners arranged in the broiler compartment in parallel spaced relation and formed in their opposite sides below the center lines thereof with laterally directed flame ports arranged to project flames in opposite directions from one burner toward another, and a plurality of fire-brick slabs arranged between each pair of burners and at the outer sides of the end burners above the level of the flame ports and being closely fitted to the burners so as substantially to embed the burners therein, the fire-brick slabs being imperforate save for localized vents formed therein remote from the burner to permit the heat currents to pass through the slabs, whereby the fire-brick slabs serve the two-fold purpose of radiating heat from the burner flames and shielding the burners from the heat of the flames.

3. In a gas broiler, the combination of a series of burners non-circular in cross-section arranged in the broiler compartment in parallel spaced relation and having their major cross-sectional axes extending vertically, the burners being formed in their opposite sides below the center lines thereof with laterally directed flame ports arranged to project flames in opposite directions from one burner toward another, and a plurality of fire-brick slabs arranged between each pair of burners and at the outer sides of the end burners with their bottom surfaces immediately above the level of the flame ports and being closely fitted to the burners so as substantially to embed the burners therein, the fire-brick slabs being imperforate save for localized vents formed therein remote from the burners to permit the heat currents to pass through the slabs near the tips of the flames, and the slabs being formed on the imperforate portions of their bottom surfaces with tapering projections adapted to be brought to incandescence by the heat currents passing to the vents, whereby the fire-brick slabs serve the two-fold purpose of radiating heat from the burner flames and shielding the burners from the heat of the flames.

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