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GAS STOVE OR RANGE

Original Filed Sept. 18, 1925

Fig. 1.

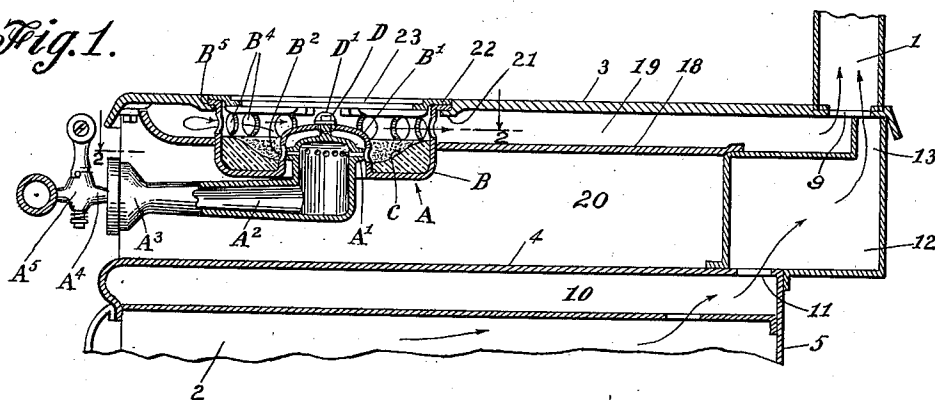


Fig. 2.

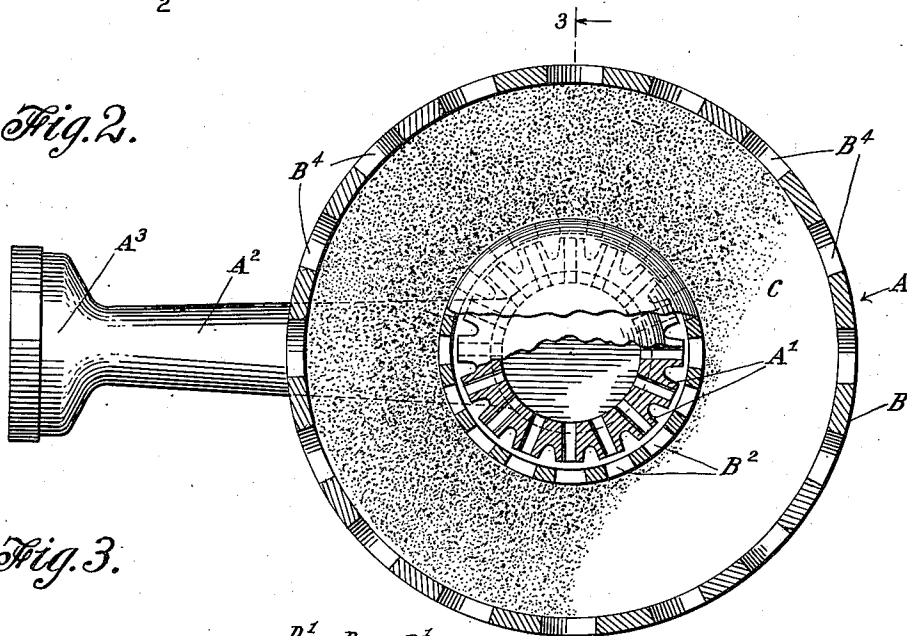
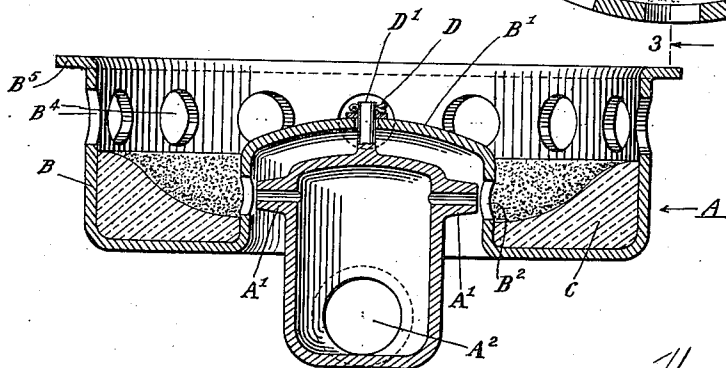


Fig. 3.



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GAS STOVE OR RANGE

Original application filed September 18, 1925, Serial No. 57,057. Divided and this application filed February 20, 1928. Serial No. 255,576.

This invention relates to gas stoves or ranges, and more particularly to ranges having a closed or solid cooking top. One of the principal objects is to adapt to a range of this variety a Bunsen burner of the lateral flame type with provision for a plentiful supply of secondary air to support combustion, together with means for utilizing the full heating effect of the burner flames and for concentrating the heat substantially within the zone of the flamespread.

In carrying out the invention, it is proposed to make use of the improved burner unit disclosed in the parent application Serial No. 57,057 above referred to, and which unit comprises specifically a Bunsen burner member formed with a circular series of laterally directed flame ports, a pan-shaped metal shell or casing surrounding the burner member and forming a combustion chamber therefor with vents at the top for the products of combustion, the said shell being provided with a raised central portion forming a secondary air chamber within which the burner member is located and having discharge openings leading from the secondary air chamber into the combustion chamber adjacent or in line with the flame ports, and a ring-like bed of refractory material located within the metal shell around the central raised portion and forming the floor of the combustion chamber and adapted to be heated to incandescence by the flame jets. These burner units are arranged beneath the closed cooking top, being suspended therefrom or otherwise supported, and associated therewith is a burner plate located below and in close parallel relation to the cooking top and forming in connection therewith a closed heat generating chamber, which chamber at the rear has an outlet for the products of combustion, and at the front it communicates with the combustion chambers formed within the burner casings. As the range is thus constructed, the secondary air is supplied and distributed in ample quantity to all of the flame jets in order to insure complete combustion under all conditions of use, and the lateral and end heat losses of the flame jets are absorbed and radiated back substantially

within the zone of the flamespread. The intense incandescence of the refractory bed in conjunction with the positive and complete aeration of the flame jets permits of combustion over the whole area of the localized combustion chambers and greatly increases the heating efficiency of the burner units, and this whether the burners are operating at high or low pressure, it being observed that both the direct and radiant heat of the burner flames are utilized to the fullest extent. The metal shells are also useful in preventing contamination of the secondary air supply by the waste products of combustion, as well as in guarding against back pressure, flame deflection, air currents, and other influences which might interfere with proper combustion or impair the heating efficiency of the burner. The improved arrangement is particularly advantageous in cases where it is desired to locate the burner units in close proximity to the cooking top or cooking utensil thereon, being such that the flame jets are entirely enveloped with secondary air before they reach or contact with the heated part and the fuel wholly consumed within the limited area of the flamespread. The exact construction of the parts and their advantages will best be understood from the detailed description to follow.

In the accompanying drawings:

Fig. 1 is a vertical section taken through the upper part of a range of the closed-top variety constructed in accordance with this invention;

Fig. 2 is a sectional plan view of the improved burner unit as shown in Fig. 1, taken on the line 2-2 of that figure; and

Fig. 3 is a vertical section taken on the line 3-3 of Fig. 2.

The improved unit comprises, generally speaking, a Bunsen burner member A, a shell or casing B, and a heat deflector C.

The burner member A may be of any desired shape or form, depending largely upon the use to which the unit is to be put, but in the exemplary embodiment herein shown, it is provided with a single circular row or series of nibs A¹ having orifices through which the gaseous mixture issues and which

constitute the flame ports of the burner. The fuel is supplied to the burner member, as usual, through a mixing tube A^2 provided at its entrance end with an air chamber A^3 into which the gas is discharged from a nozzle A^4 under the control of a stop cock or valve A^5 . In the drawings, the flame ports are shown as directed laterally, as distinguished from vertically or perpendicularly, the gas nibs A^1 extending outwardly in a truly horizontal direction, although they might extend upwardly at an inclination to the horizontal. The invention is primarily concerned with burner members formed with such laterally directed flame ports, having in view the complete aeration of the flame jets and the elimination of the heat losses incident to burners of this type. In this connection it may be stated that heretofore in the use of burners of the type in question, the secondary air supplied to the burners reaches only the undersides of the burner flames, except possibly a trifling quantity which may percolate through the flames to the upper sides, with the result that imperfect combustion takes place, causing the liberation of poisonous carbon monoxide fumes and lowering the heating efficiency of the burners. This is especially true when the burners are placed close to the cooking utensil or the closed cooking top, when back pressure occurs or eddies are created which limit or prevent the percolating action referred to. Moreover, in burners of this type, there is a considerable wastage of the heat units due to the horizontal disposition of the flame jets. In other words, the direct heat of the burner is derived almost entirely from the upper sides of the flame jets, the heat given off by the undersides and tip ends of the flames being largely dissipated instead of concentrated upon the cooking utensil. With this brief explanation, it is believed the utility of the present invention will become more apparent.

The shell or casing B, which preferably is made of metal, may likewise be of any desired shape or form, depending largely upon the form or shape of the burner member. In the present instance, the shell is made in the shape of a pan to surround the burner member and has a central raised bottom portion B^1 to serve as a cover for the burner member. As thus constructed, the space within the pan-shaped shell B constitutes a combustion chamber open at the top to allow the flames to act directly upon the part to be heated, while the space within the cover portion B^1 constitutes a secondary air chamber containing the burner member and open at the bottom for the admission of air thereto. Communication between the two chambers is established by means of a series of discharge openings B^2 formed in the side wall of the cover portion B^1 in registry with the flame ports of the burner member. While the

gas nibs A^1 might project into or through the secondary air discharge openings B^2 , it is preferred to have them terminate short of the discharge openings as shown, so that in this way the flame jets may directly entrain whatever quantity of secondary air is required to support combustion. In the drawings, the pan-shaped shell B is shown as being quite deep, having its upper edge terminating in a horizontal plane located well above the cover portion B^1 . This particular construction is employed when it is desired to close the combustion chamber at the top, for example as in Fig. 1, hence in such cases the shell is formed near the top with outlet openings or vents B^4 for the products of combustion.

The heat deflector C may similarly be of any desired shape or form, depending also upon the form or shape of the burner member, or at any rate upon the disposition of the flame ports, and may be made of any desired material adapted to function in the required manner. In the present instance, the deflector forms the floor of the combustion chamber created by the shell B and is composed of some refractory material, such as fireclay, which is adapted to be heated to incandescence by the flame jets, and which will absorb the heat losses of the flame jets and radiate them back substantially into the zone of the flamespread. In the form shown, the deflector is laid in a ring-like bed in the bottom of the shell B around the central raised cover portion B^1 , and has its upper or radiating surface curved upwardly and outwardly from a horizontal plane located below the secondary air discharge openings B^2 . This curvature is such that the flame jets (which are projected outwardly in a truly horizontal direction) will contact with the radiating surface at their tip ends as well as at their undersides. It is pointed out, however, that the refractory bed is so shaped that its radiating surface will contact only with the outer or feather parts of the flame jets and not with the inner or cone parts thereof, thereby permitting combustion to take place without interference or disturbance.

In Fig. 1 the above described burner unit is illustrated as embodied in a gas range comprising an oven 2 and a closed smooth-surfaced cooking top 3, the latter being arranged above and in spaced relation to the top wall 4 of the oven and extending rearwardly beyond the back wall 5 of the range and formed throughout its length with a series of outward openings or vents 9 adapted to discharge into a flue 1 the products of combustion issuing from both the top burners and the oven burner. At this point it may be noted that the products of combustion from the oven 2 pass off through a top flue 10 communicating at the rear through openings

the part to be heated, so that such part (whether a cooking utensil or the closed cooking top) will be subject to both the direct and radiant heat of the burner flames. The refractory bed, in addition to the performance of the important functions just noted, also aids in promoting combustion, serving by its incandescence to heat and consume any unburnt gases which may enter the combustion chamber from the flame ports. In fact, the flame jets will spread and form practically a continuous sheet of flame covering the entire radiating surface of the refractory bed, although still confined to that area. In this way, an intense heating effect may be produced within the limited area of the combustion chamber without interfering with proper combustion and with the minimum consumption of fuel.

The invention is not, of course, confined to the precise constructions shown and described, nor to any particular construction by which the same may be carried into effect, as many changes may be made in the details thereof without departing from the main principles of the invention and without sacrificing its chief advantages. It should be understood, therefore, that the invention is not limited to any specific form or embodiment, except in so far as such limitations are specified in the claims.

Having thus described my invention, its construction and mode of operation, what I claim and desire to secure by Letters Patent of the United States, is as follows:

1. A gas range including, in combination, a closed cooking top, a Bunsen burner supported beneath the cooking top and formed in its outer periphery with a series of laterally directed flame ports, a shell surrounding the burner and forming a combustion chamber around the burner as well as a secondary air chamber wherein the burner is located, the said shell being formed in its side wall adjacent the flame ports with openings leading from the secondary air chamber into the combustion chamber, and a burner plate located below and in close proximity to the cooking top and forming in connection therewith a heat generating chamber, the said heat generating chamber having an outlet for the products of combustion and communicating with the aforesaid combustion chamber and otherwise closed to the atmosphere.

2. A gas range including, in combination, a closed cooking top, a Bunsen burner supported beneath the cooking top, a shell surrounding the burner and forming a combustion chamber as well as a secondary air chamber therefor, the said shell being formed adjacent the flame ports with openings leading from the secondary air chamber into the combustion chamber, a heat deflector composed of refractory material supported within the shell and forming the floor of the combustion

chamber, and a burner plate located below and in close proximity to the cooking top and forming in connection therewith a heat generating chamber, the said heat generating chamber having an outlet for the products of combustion and communicating with the aforesaid combustion chamber and otherwise closed to the atmosphere.

3. A gas range including, in combination, a closed cooking top, a burner plate supported below and in close proximity to the top and forming in connection therewith a closed heat generating chamber having an outlet for the products of combustion, a shell fitted in a recess in the burner plate and having its upper edge arranged in contact with the cooking top, the said shell forming an interior combustion chamber communicating through vents with the heat generating chamber and an exterior secondary air chamber communicating through discharge openings with the combustion chamber, and a Bunsen burner supported within the secondary air chamber and formed with flame ports registering with said discharge openings.

4. A gas heating apparatus including, in combination, a heat generating chamber having an outlet for the products of combustion, a Bunsen burner associated with said chamber and formed with laterally directed flame ports, and a shell separating the burner from the heat generating chamber and forming on the one hand a restricted combustion chamber extending around the burner and communicating with the heat generating chamber, and on the other hand a secondary air chamber wherein the burner is located and communicating with the combustion chamber through openings formed in a side wall of the separating shell adjacent the flame ports.

5. A gas heating apparatus including, in combination, a heat generating chamber having an outlet for the products of combustion, a Bunsen burner associated with said chamber and formed with laterally directed flame ports, a shell separating the burner from the heat generating chamber and forming on the one hand a restricted combustion chamber extending around the burner and communicating with the heat generating chamber, and on the other hand a secondary air chamber wherein the burner is located and communicating with the combustion chamber through openings formed in a side wall of the separating shell adjacent the flame ports, and a heat deflector composed of refractory material supported within the shell and forming the floor of the combustion chamber.

6. A gas range including, in combination, a closed cooking top having a lid opening and a removable lid therefor, a circular Bunsen burner located below the lid opening and formed with laterally directed flame ports, and a heat deflector extending around the

11 with an outlet chamber or pocket 12 having a narrow passage 13 registering with the vents 9. A burner plate 18 (preferably made of cast iron) is located in the space between the closed cooking top 3 and the oven top wall 4 and provides in effect an upper heat generating chamber 19 and a lower secondary air chamber 20. As shown, the burner plate is arranged in close parallel relation to the overlying cooking top so as to provide a shallow heat generating chamber which will serve to heat the entire top whether one or more of the burners are in operation at a time. In this connection it may be stated that it is proposed to employ a plurality of burner units below the forward portion of the cooking top, although only one is shown in Fig. 1. The burner plate 18 is recessed at the front to receive the burner unit and is designed to exclude secondary air from the heat generating chamber except that which is entrained by the burner flames. In providing for the support of the burner unit, the shell or casing B is provided at its upper edge with an annular flange B⁵ which seats upon a similar flange 21 formed around the edge of the lid opening 22 of the cooking top 3, the two flanges being sufficiently depressed to receive and give support to the customary lid 23 flush with the upper surface of the cooking top. As thus arranged, the shell B becomes a supporting member for the burner A which is suspended therefrom by means of a cotter pin D passed through a perforated lug D¹ extended upwardly from the burner through an aperture in the top of the cover portion B¹. As will be observed, the shell B is of the same diameter as the lid opening, so that the combustion chamber formed within the shell is limited to the area of the lid opening; hence when a cooking vessel is placed in the lid opening or upon the lid, the direct and radiant heat of the burner may be concentrated thereon, the arrangement being such that the burner flames may be brought as close to the top as desired without danger of interfering with proper combustion. The waste products leave the combustion chamber through the vents B⁴ of the shell B and enter the heat generating chamber 19, flowing rearwardly therethrough and escaping into the flue 1. In escaping, the waste products are caused to give up their heat to the overlying rear portion of the cooking top, which may thus be said to possess a secondary calorific surface available for slow cooking and warming up or keeping hot such food as may already have been cooked. The heating capacity of the escaping products is greatly increased by the shallow character of the heat generating chamber, due to the close proximity of the burner plate 18 with the cooking top 3, the products being caused to pass between the two without substantial expansion in a stratum of substan-

tially uniform character which imparts practically the whole of its heat to the cooking top on the one hand and the burner plate on the other. The burner plate becoming hot, will in turn radiate its heat to the overlying cooking top and aid further in promoting the heating efficiency of the range in this respect. Moreover, some of the heat radiated from the burner plate will be imparted to the air entering the underlying secondary air chamber 20 and hence enable the air to be more effectively entrained at the flame ports. The effect above described will take place whether one or more of the burners are in operation at the same time, although necessarily the maximum heating effect will be obtained by the use of all the burners simultaneously. Once the cooking top is heated, one burner alone will keep it hot, since the heat generating chamber is substantially coextensive with the top and allows the heated products of combustion to be distributed uniformly throughout the entire under surface of the top. The behavior of the burner unit will have been understood from the foregoing description, it being apparent that no secondary air can enter the heat generating chamber except that which is entrained through the discharge openings B² by the flame jets directly. It hardly needs to be stated that the secondary air will be drawn in from the chamber 20 through the open bottom of the cover B¹.

It will now be seen that, in the operation of the improved range, the secondary air is supplied to the burner in pure atmospheric condition and without contamination by the waste products, being drawn up through the open bottom of the secondary air chamber and then entrained from said chamber directly by the flame jets as they project through the discharge openings B² into the combustion chamber formed by the shell B. Since the discharge openings entirely surround the flame ports, each flame jet will be entirely enveloped with secondary air in order to produce complete combustion. In other words, notwithstanding the lateral disposition of the flame ports, the secondary air will reach, not merely the undersides of the flame jets, but every part thereof and in quantities regulated by the flame jets themselves. As the flame jets enter the combustion chamber, they contact with the radiating surface of the refractory bed B (which, incidentally, may be plain, as shown, or nodular or of any other desired configuration), heating it to incandescence. As before explained, both the lower sides and tip ends of the jets will impinge against the refractory bed, the upper sides of the jets only being utilized for direct heating. The heat absorbed by the refractory bed, which would otherwise be lost or wasted, is radiated back into the zone of the flamespread and concentrated upon

burner and adapted to be heated to incandescence by the laterally directed flame jets, said heat deflector having an outside diameter substantially equal to that of the lid opening whereby to concentrate heat losses of the laterally directed flame jets upwardly against the cooking top substantially within the zone of the lid opening.

7. A gas range including, in combination, a closed cooking top having a lid opening and a removable lid therefor, a circular Bunsen burner located below the lid opening and of less diameter than that of said lid opening, said burner being formed in its outer periphery with laterally directed flame ports, and a circular bed of refractory material extending around the outside of the burner in position to be heated to incandescence by the laterally directed flame jets, said refractory bed having an outside diameter substantially equal to that of the lid opening whereby to concentrate heat losses of the laterally directed flame jets upwardly against the cooking top substantially within the zone of the lid opening.

In testimony whereof, I have affixed my signature hereto.

HENRY W. O'DOWD.