

A. L. BAILEY.
GAS BURNER.

APPLICATION FILED MAY 13, 1918.

1,286,493.

Patented Dec. 3, 1918

3 SHEETS—SHEET 1.

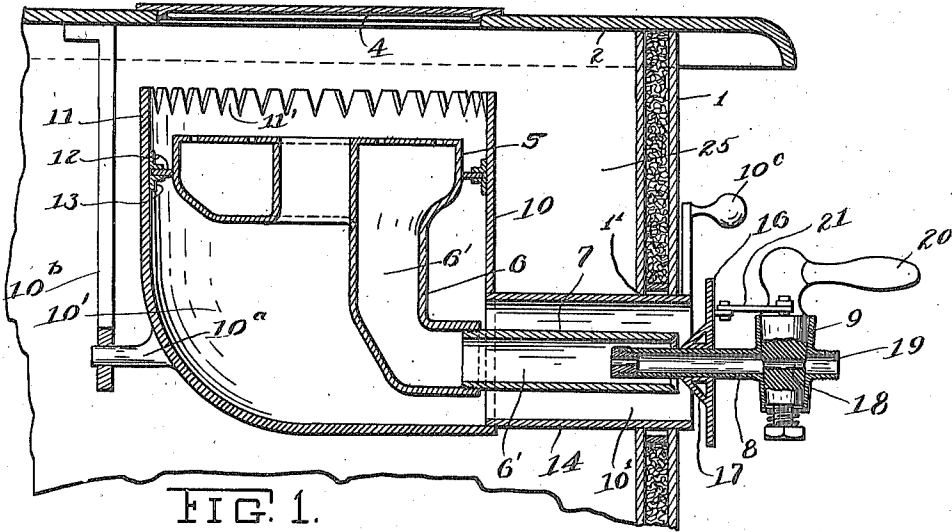


FIG. 1.

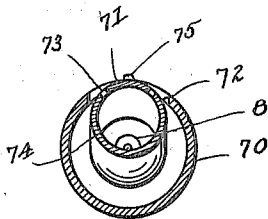


FIG. 6.

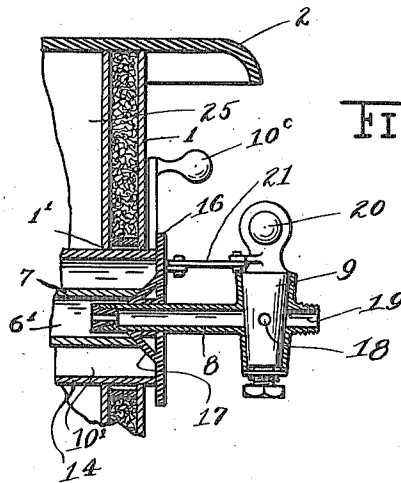


FIG. 2.

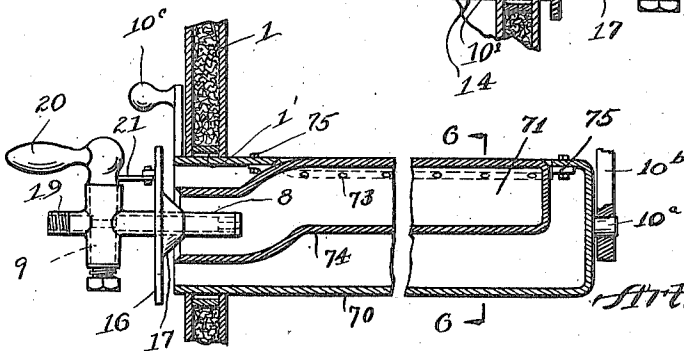


FIG. 5.

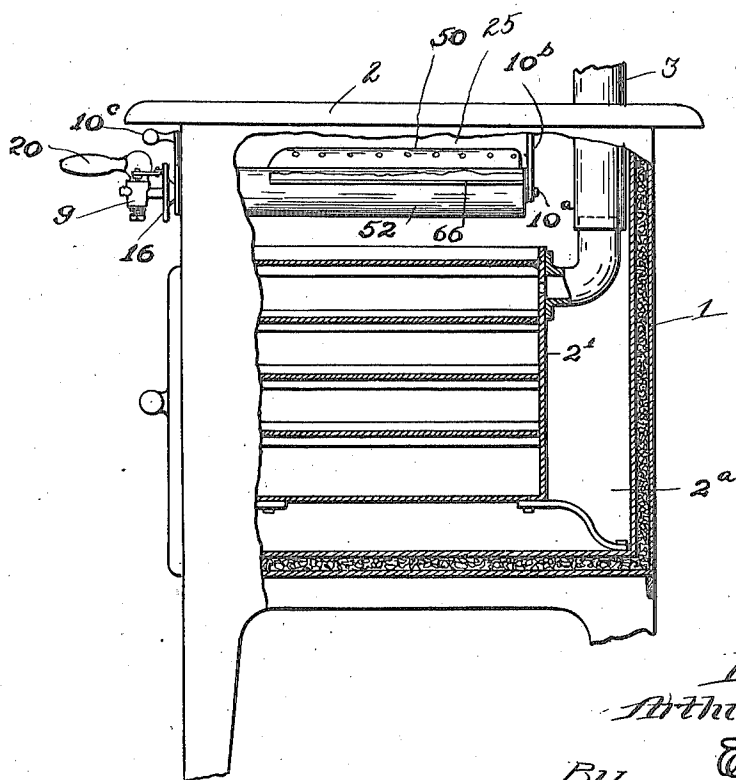
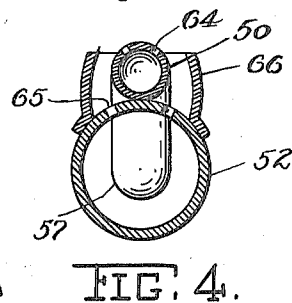
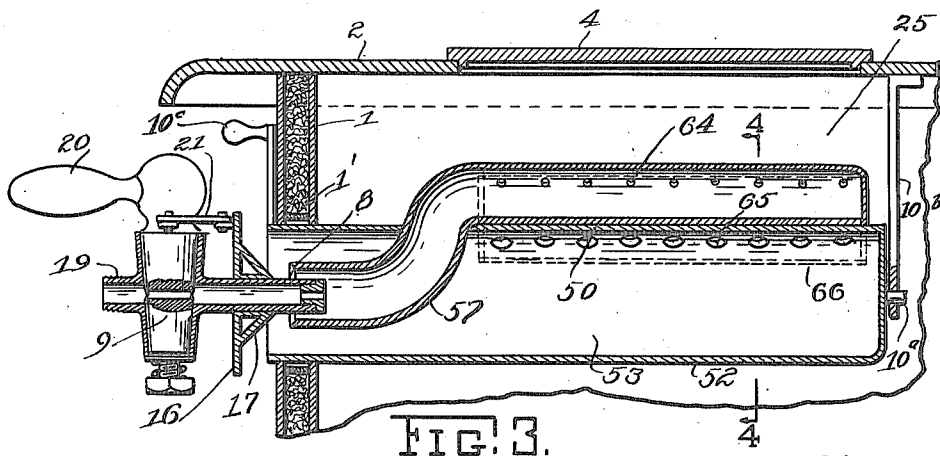
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

FIG. 8.

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UNITED STATES PATENT OFFICE.

ARTHUR L. BAILEY, OF JAMAICA PLAIN, MASSACHUSETTS.

GAS-BURNER.

1,286,493.

Specification of Letters Patent.

Patented Dec. 3, 1918.

Application filed May 13, 1918. Serial No. 234,056.

To all whom it may concern:

Be it known that I, ARTHUR L. BAILEY, a citizen of the United States, residing at Jamaica Plain, county of Suffolk, Commonwealth of Massachusetts, have invented certain new and useful Improvements in Gas-Burners, of which the following is a specification.

This invention relates to gas burners, and particularly to the delivery and regulation of the air and gas supplied thereto for combustion and circulation purposes. My burner is primarily designed for use in a substantially closed chamber having a flue, such as illustrated in the gas cooking range of my prior Patents No. 1237275, granted August 21, 1917, and No. 1258084 granted March 5, 1918 and in the further treatment thereof herein, I shall discuss it in such relation. It will be understood that this selection is chiefly for illustrative purposes, and that the principles involved are applicable to any construction in which a mixture of air and gas is burned.

One of the difficulties encountered in the use of a burner set in a closed chamber having a flue is the tendency of the flue to draw the air supplied for combustion purposes out of the burner chamber and into and around the oven, or ovens. This has the effect of causing the burner flame to "float" or smother, because of lack of a constant and adequate supply of air to properly support combustion within the chamber.

Another difficulty is that any admission of the cold outside air into the chamber through those burners which are not in operation reduces the efficiency of the stove, in that this outside air is required to be warmed by the burner or burners in operation and is circulated about the stove with the heat delivered by the burner in operation. Usually, also the burners are mounted for reversal, so that their flame may be directed either upwardly or downwardly, according to the particular cooking operation being performed, and this has further complicated the problem of maintaining proper combustion at all times and under all conditions of use.

The objects of my invention broadly stated, are to provide a simple, reliable and efficient construction for overcoming these several objections. More specifically my invention is constructed and arranged to deliver for purposes of combustion and circulation both primary and secondary air to

the burner in quantities related to each other and to the quantity of gas admitted, whereby the requisite amount of primary air necessary to support combustion is introduced directly into and mixed with the gas supplied, and whereby the requisite amount of secondary air to eliminate the usual smothering and "floating" common to all gas burners located in chambers which are closed to the direct and free admission of air is discharged about the burner. For convenience of control, the valves or dampers for regulating the admission of the primary and secondary air are arranged for simultaneous proportionate opening and closing movement, and are further connected to a common operating element, which may be conveniently the usual cock regulating the supply of gas to the burner, whereby all valves may be simultaneously and conveniently operated. This arrangement prevents liability of failure to open or close any valve, through forgetfulness or otherwise, and also obviates the necessity for adjusting the degree of operating or closing of the several valves as all valves are initially set to open and close the proper amount proportionately to each other when assembled and this initial adjustment need not be altered. By this arrangement, therefore, I am enabled to vary the quantity of both primary and secondary air admitted to the burner in relation to the quantity of gas supplied, simultaneously by the operation of a single operating element, and to positively prevent admission of any air to the burner chamber through those burners which are not in operation thus increasing the efficiency of the apparatus. I am also able to secure an initial heating of all air admitted to an intensity best suited for immediate combustion. These and certain other features of advantages, which will appear more fully hereinafter, are secured in the device of the present invention, the construction and operation of which, together with selected embodiments illustrative of the principles involved, is described in the following specification, illustrated in the accompanying drawings, and particularly pointed out in the appended claims. Throughout the specification and the drawings like reference characters are correspondingly applied, and in the drawings I have illustrated my invention in its application to both the circular or star-shaped and the straight or bar type of burner. By slight modification of existing

structures however, my invention may be adapted to any design of burner.

Figure 1 is a vertical section through a gas burner of the circular type in accordance with my invention, and illustrating its application to a gas cooking stove, the several valves being shown in their open position.

Fig. 2 is a similar view showing the valves closed.

Fig. 3 is a vertical section through a burner of the bar type in accordance with my invention.

Fig. 4 is a section on the line 4-4 of Fig. 3.

Figs. 5 and 6 are views corresponding to Figs. 3 and 4 of a modified form of bar burner.

Fig. 7 is an end elevation, partly broken away, of a gas cooking stove, equipped with a burner of the bar type, and

Fig. 8 is a plan view partly broken away of a gas stove equipped with burners of the type shown in Figs. 1 and 2.

I have indicated generally at 1 a gas cooking stove, substantially similar to that illustrated in my prior patents, hereinbefore referred to. The walls of the stove extend upwardly to the top 2 and provide therewith a substantially closed burner chamber 25 in which the burner set may be mounted.

In a stove of the kind indicated, the oven 2¹ is supported within the stove walls below the top 2 in spaced relation whereby to provide a continuous heat circulating passage 2^a around the oven and in communication with the burner chamber. (See Fig. 7.)

The flue 3 connects with this passage 2^a and the draft induced thereby causes the heat delivered by the burners to circulate through the burner chamber and about and if desired, through the oven. The top 2 may have any desired number of lid-covered cooking openings, indicated at 4, and preferably located directly over the burners, and the burners may be either of circular type illustrated in Fig. 1, or the bar type, illustrated in Figs. 3-6, or of any other suitable type.

Within the burner chamber is mounted a set of burners 5. In the form illustrated in Fig. 1, each burner has a depending tubular portion 6 with which a horizontally extending tube 7 may connect. The tubes 6 and 7, constitute a mixture passage 6¹ for the primary air and the gas, the primary air entering the outer end of the tube 7 and the gas discharging into said passage from the nipple 8 of the gas cock 9.

Each burner 5 is supported within and spaced from a casing 10 arranged in the burner chamber. As here shown, the burner and casing have opposed lugs 12 and 13, which sustain the weight of the burner.

The casing 10 entirely surrounds the burner and tubes 6 and 7, the space 10¹ there-

between constituting a passage for the secondary air, which enters the outer end 14 of the casing through an inlet port 1¹ formed in the front stove wall. Said end 14 may conveniently be mounted in said port 1¹.

The opposite end 11 of the casing extends upwardly above the burner to the stove top 2, and is open to permit the flame to be delivered against said top or against a receptacle set over the overlying opening 4 of the top. If desired, said end 11 may be serrated or otherwise irregularly formed, as indicated at 11¹, to prevent smothering of the flame by the receptacle.

Each burner 5 and its casing 10 may be either detachably supported within the stove or may be reversibly mounted to deliver the heat either upwardly toward the stove top 2 or downwardly toward the oven 2¹. Where reversibly mounted, the casing 10 may conveniently have a trunnion 10^a which is received in a suitable bearing 10^b depending from the stove top 2, the outer end 14 of the casing being provided with an operating handle 10^c disposed externally of the stove wall, whereby the casing, and with it the burner, may be turned about the trunnion as an axis. The bearing 10^b and the bearing afforded by the front stove wall at the port 1¹ sustain the weight of the casing and burner.

The admission of outside air into either the mixture passage 6¹ or the secondary air passage 10¹ is regulated and is positively prevented, when the burner is not in operation, by a disk valve 16 of a diameter sufficient to overlap the intake end 14 of the casing, (see Fig. 2), and mounted to slide upon the nipple 8 toward and from the air inlet opening 1¹. When the valve 16 is in its open position, indicated in Fig. 1, the outside air enters the inlet opening 1¹ in an amount regulated by the degree of opening of the valve. The entrance of the admitted air into the passage 6¹, when the valve 16 is open, is controlled by a conical valve 17 adapted to be operated by and in the operation of the valve 16, and as here shown mounted on said valve 16 to move therewith. The valve 17 seats on the appropriately formed end of the pipe 7 to seal said pipe. As here shown both valves 16 and 17 are coaxially arranged on the pipe 8.

The admission of gas to the burner is controlled by the gas cock 9, which is of usual construction, having a transverse bore 18 in its rotatable plug portion adapted to be moved into and out of register with the nipple 8 and with the aligned nipple 19 with which the gas supply connects, (see Figs. 1 and 2), and being provided with the usual operating handle 20.

As here shown, the rotatable plug 9 and the valve 16, and with it the valve 17, are adapted to be simultaneously opened and

closed upon operation of the handle 20, being connected for this purpose in any suitable manner, as by the link 21. Thus all three controls 9, 16 and 17 are operated simultaneously from a common operating element, (the handle 20) and the volume of air and gas admitted for mixture and delivery to the burner, as well as the volume of secondary air admitted, are capable of regulation as to their relative proportions.

The primary air is thus introduced directly into the gas being supplied to the burner, while the secondary air is drawn through and around the burner by the draft induced by the flue 3, and when the burner is in operation, becomes intensely heated and assists combustion, as well as preventing the smothering of the gas flames.

When the burner is not in operation, the same actuation of the handle 20 which cuts off the gas supply automatically and simultaneously causes the disk valve 16 to close the intake end 14 of the casing 10, and seats the valve 17 over the intake end of the tube 7, thus preventing entry of outside air.

In Figs. 3 and 4, I have illustrated the application of the principles of my invention to a burner of the straight or bar type. In this adaptation, the form of casing is slightly different, although the same principle is present.

In these figures, the bar burner 50 is partially inclosed in a tube or casing 52 of suitable diameter to provide a secondary air space 53 enveloping the burner. The casing is hung within the burner chamber as in the form shown in Figs. 1 and 2, and has centered therein, a gas and air mixture tube 57, the inner end of which, as here shown, is offset upwardly and extended over the burner and suitably secured to the casing.

The admission of air into the casing 52 and of the air and gas into the mixture tube 57 is controlled as in Figs. 1 and 2. The primary air and gas, when ignited, discharges through the usual flame emission openings 64 of the burner.

The secondary air admitted into the space 53, when the burner is in operation, is drawn by the draft induced by the flue 3 up and around the burner through suitable discharge openings or the like 65 formed in the upper wall of the casing 52. In order to insure proper delivery of this air to and about the burner, the casing 52 may be provided with suitably shaped longitudinally extending deflectors 66. When the burner is not in operation, all air is excluded from entry into the burner chamber.

In Figs. 5 and 6, the construction is much the same as in Figs. 3 and 4. The casing 70 for the burner 71 is longitudinally slotted along its upper face, as indicated at 72 so that the secondary air is drawn along the burner adjacent the flame emission openings

73 thereof. The air and gas mixture tube is indicated at 74, and is offset as in Figs. 3 and 4, and detachably secured to the casing as indicated at 75. The control of the primary and secondary air and of the gas is the same as in the other views, and as here shown, the burner and casing are reversibly mounted.

By preventing the admission of outside air, when a burner is not in operation, I prevent this loss of efficiency. The effect of the secondary air, when admitted to the burner, however, is to increase the efficiency of the apparatus by securing more nearly perfect combustion. The draft created by the flue causes the air to draw through and around the burner, producing a characteristic long blue intensely hot flame. This same draft also circulates the heat delivered about the oven or ovens.

While I have shown and described several forms of burner to which the principles of my invention are applicable, it will be understood that the invention may be used with practically any type of burner operating with a mixture of air and gas. Various modifications in the forms and construction of my invention may obviously be resorted to, within the limits of the appended claims.

What I therefore claim and desire to secure by Letters Patent is:

1. In combination, a gas stove having a substantially closed burner chamber adapted to connect with a draft source, a plurality of burners, arranged in said chamber, means for supplying a mixture of primary air and gas to each burner, means for independently supplying secondary air to each burner, said primary and secondary air for each burner passing to the burner through the same inlet opening, and means for preventing the admission of said air into said burner chamber through any burner not in operation.

2. In combination, a gas stove having a substantially closed burner chamber adapted to connect with a draft source, a plurality of burners arranged in said chamber, means for individually supplying a mixture of primary air and gas to each burner, means for individually delivering secondary air to each burner, said primary and secondary air for each burner passing to the burner through the same inlet opening, and means operated by and in the operation of the gas controlling means for preventing the admission of air into said burner chamber through any burner not in operation.

3. In combination, a gas stove having a substantially closed burner chamber provided with a flue, a burner set located in said chamber, means for supplying a mixture of air and gas to each burner, means for supplying secondary air to each burner, said air for mixture and said secondary air hav-

ing a common inlet leading to a burner, and means for preventing admission of air into the chamber through any burner not in operation.

5 4. In combination, a gas stove having a substantially closed burner chamber provided with a flue, a burner-set located in said chamber, means for supplying a mixture of
10 air and gas to each burner, means for supplying secondary air to each burner, said air for mixture and said secondary air having a common inlet, and means for preventing admission of air into the chamber through
15 any burner not in operation, said last named means operated by and in the movement of the means for controlling the supply of gas to the burner.

5. In combination, a gas stove having a substantially closed burner chamber provided with a flue, a burner set in said chamber, a casing substantially inclosing each burner and having an inlet opening for the admission of secondary air, an air and gas mixture conduit arranged within said casing
20 and delivering to said burner and having an air inlet opening coinciding with that of the casing, a gas cock controlling the supply of gas to said conduit, and a valve controlling the admission of primary air into
25 the air and gas mixture conduit and secondary air into the casing.

6. In combination, a gas stove having an inlet port in a wall thereof, a burner mounted within said stove, a casing substantially
30 inclosing said burner and communicating with said inlet port, an air and gas mixture conduit arranged within said casing and communicating with said inlet port, a gas cock controlling the supply of gas to said
35 conduit, and a valve controlling the admission of primary air into the air and gas mixture conduit and secondary air into the casing, said valve operated by and in the operation of the gas cock.

7. In combination, a gas stove having an inlet port in a wall thereof, a burner mounted within said stove, a casing substantially inclosing said burner, an air and gas mixture conduit arranged within said casing, said
45 casing and conduit having a common communication with said inlet port, a gas cock controlling the supply of gas to said conduit, and two valves operatively connected with each other and controlling the admission of
50 primary air into the air and gas mixture conduit and secondary air into the casing, said valves operated by and in the operation of the gas cock.

8. In combination, a gas stove having a substantially closed burner chamber provided with a flue, a burner set located in said chamber, an air and gas mixture conduit leading from each burner outwardly to the external atmosphere, a casing substantially
60 tially surrounding said conduit and its

burner and spaced therefrom to define a passage for the admission of secondary air and opening into the external atmosphere, a valve controlling the admission of secondary
70 air into said casing, a valve controlling the admission of primary air into said mixture conduit, and a valve controlling the admission of gas into said mixture conduit and operatively connected with said first-named
75 valves whereby the operation of said gas control valve simultaneously operates said other valves.

9. In combination, a gas stove having a substantially closed burner chamber, provided with a flue, a burner set located in
80 said chamber, an air and gas mixture conduit leading from each burner, a casing substantially surrounding said conduit and its burner and spaced therefrom to define a passage for the admission of secondary air, said conduit and casing having a common inlet opening, a valve controlling said opening, a valve carried by said first-named valve and controlling the admission of primary
85 air into said mixture conduit, and a valve controlling the admission of gas into said mixture conduit and operatively connected with said first-named valves whereby the operation of said gas control valve simultaneously operates said other valves.
90 95

10. A gas stove having a burner chamber, a burner therein, a casing about said burner, an air and gas mixture conduit arranged within said casing and delivering to said burner, said casing and conduit having a
95 common air inlet port, a valve controlling said port, a gas cock, a valve controlling the intake end of said mixture conduit, a common operating element, and operative connections from said operating element to
100 said valves and gas cock whereby all are simultaneously actuated upon operating of said common element.

11. In a gas stove having a burner chamber, a casing reversibly mounted within said
105 chamber, a burner arranged within said casing and movable therewith, said casing having an inlet port for the admission of air to the burner and having a conduit for gas to the burner, a valve controlling the supply of gas to the burner, and a valve controlling said inlet port and operatively connected with said first-named valve for proportioned opening and closing movement
110 simultaneously therewith.

12. In a gas stove, in combination, a gas burner, a casing substantially inclosing said burner, a conduit arranged within and spaced from the casing and delivering to the burner, means for supplying gas to said
115 conduit, said conduit and casing having a common air inlet, and a control for said inlet.

13. In a gas stove having a burner chamber, a burner therein, a casing substantially
120 125 130

inclosing said burner and spaced therefrom to provide a passage for air about the burner and having one of its ends extended beyond the burner and irregularly formed to provide a support for a cooking utensil placed directly thereupon whereby to prevent smothering of the burner flame.

14. In combination, a gas burner, a casing substantially inclosing the same and spaced therefrom to provide an air passage, a gas and air conduit arranged within and spaced from the casing and delivering to the burner, said casing and conduit having a common air inlet port, and said casing having an air discharge opening adjacent the burner, a gas cock nipple extending into said conduit, a gas cock, and a valve controlling said air inlet port and slidable on said nipple.

15. In a gas stove having a burner chamber, a burner arranged therein, a casing substantially inclosing said burner and spaced therefrom to provide a passage for auxiliary air to the burner, a conduit arranged in said casing for conveying a mixture of primary air and gas to the burner and having an intake opening for the admission of said primary air, a gas supply pipe discharging into said conduit, a cock controlling said gas supply, and a valve guided on said gas pipe and controlling said primary air intake opening and operated by the gas cock.

16. In combination, a gas burner, a conduit for conveying a mixture of air and gas to the burner and having an intake opening for the admission of air, a gas pipe discharging into said conduit, a cock controlling said gas supply, a valve operated by said gas cock and controlling said air intake opening, a casing surrounding said conduit and providing a passage for auxiliary air and having an air inlet opening inclosing that of the mixture conduit, and a valve for said last-named opening and carrying said first-named valve.

17. In combination, a gas burner, a casing about said burner having a controllable intake end, a conduit arranged within and spaced from said casing and leading to said burner, and adapted for the passage of a mixture of air and gas to said burner, the space between said conduit and the casing constituting a passage for secondary air, a gas supply pipe discharging into said mixture conduit, a disk valve slidable on said pipe and controlling the intake end of said mixture conduit, and a gas cock operatively connected with said disk valve whereby to move the disk valve a distance proportionate to the degree of opening or closing movement of the gas cock.

18. In combination, a burner, a casing adapted to deliver secondary air about the

burner, a conduit for delivering primary air to said burner and arranged within and spaced from said casing, and a valve controlling the admission of secondary air into said casing and primary air into said conduit.

19. In combination, a burner, a casing adapted to deliver secondary air about the burner, a conduit for delivering primary air to said burner and arranged within and spaced from said casing, the outer ends of said casing and conduit terminating adjacent each other, and a valve controlling the admission of secondary air into said casing and primary air into said conduit.

20. In combination, a burner, a casing adapted to deliver secondary air about said burner, a conduit adapted to deliver primary air and gas to said burner and arranged within and spaced from the casing, a gas supply pipe discharging into said conduit, a valve controlling the gas supply and a valve operated by said gas supply valve and controlling the admission of secondary air into said casing and primary air into said conduit.

21. In combination, a burner having an extension constituting a gas and air mixture passage, a casing surrounding said extension for supplying secondary air to said burner, means controlling the admission of air into said casing, and means simultaneously controlling the admission of air and gas into said extension.

22. In a gas stove having a cooking top provided with a lid-covered opening, and having a burner chamber, a burner mounted in said chamber below said opening of the cooking top, a casing substantially inclosing said burner and having its upper end extended above the burner and formed with a plurality of projections constituting a support for a cooking utensil placed directly thereupon whereby to prevent smothering of the burner flame.

23. In a gas stove, a gas burner, a conduit for conveying a mixture of primary air and gas thereto and having an intake opening for the admission of said primary air, controllable means for supplying gas to said conduit, a casing surrounding said conduit and providing a passage for auxiliary air to the burner and having an intake opening for the admission of said auxiliary air inclosing the air intake opening of the mixture conduit, and means for simultaneously controlling both of said air intake openings.

In testimony whereof I affix my signature in presence of two witnesses.

ARTHUR L. BAILEY.

Witnesses:

GEORGE B. RAWLINGS,
MARY V. KEARNS.