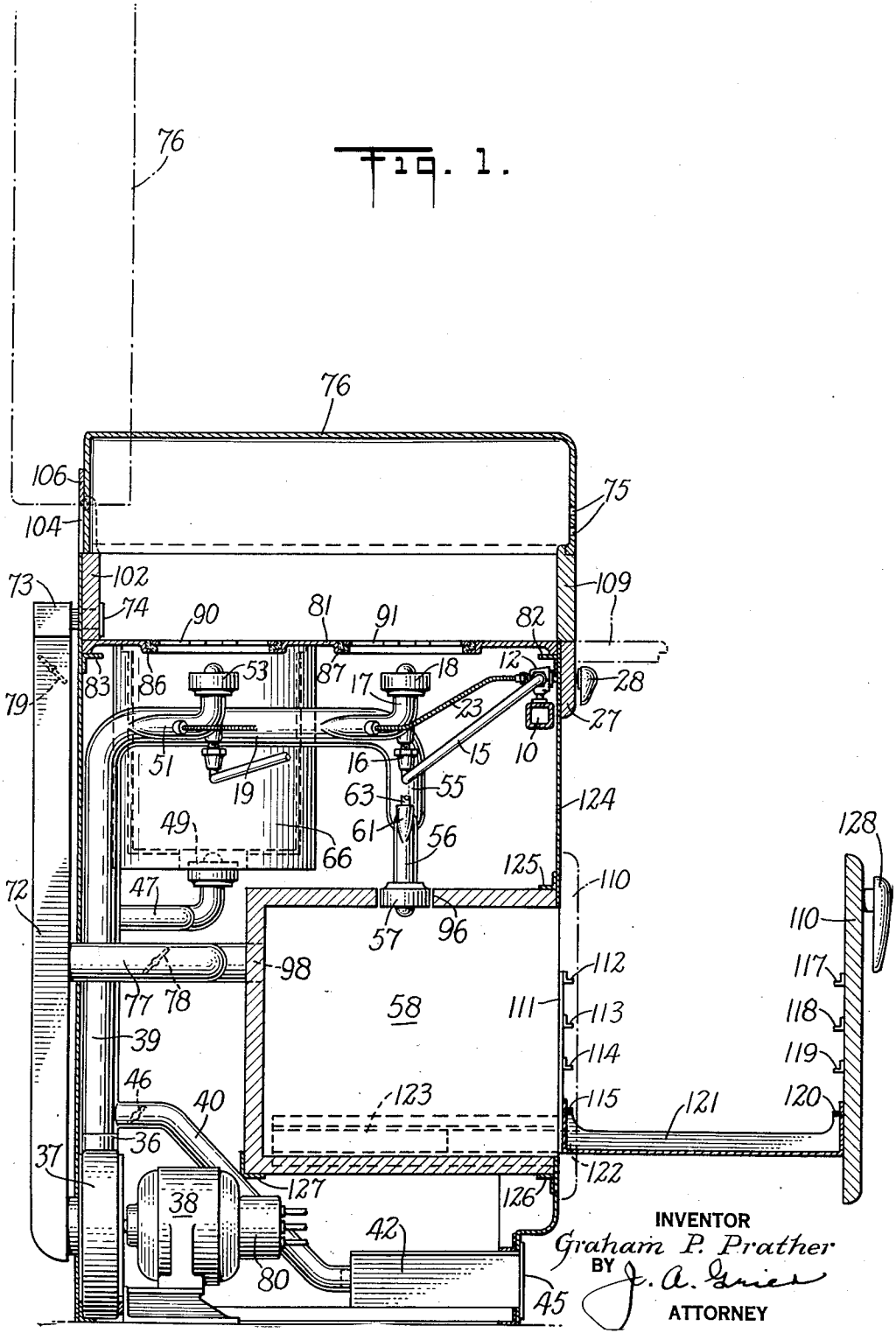
Nov. 11, 1952 G. P. PRATHER 2,617,404

GAS STOVE WITH BURNER AND COMBUSTION CONTROL ASSEMBLY

Filed Feb. 28, 1946 6 Sheets-Sheet 1

Fig. 1.



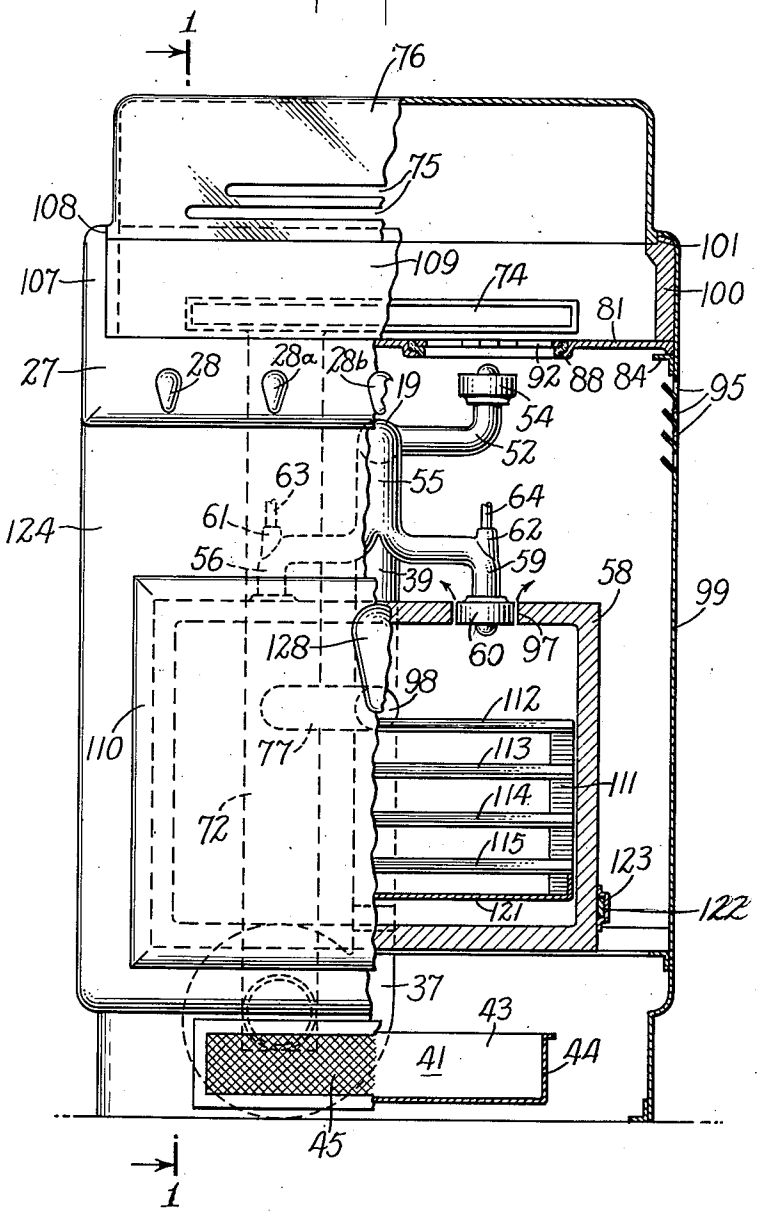
INVENTOR
Graham P. Prather
BY J. A. Grier
ATTORNEY

Nov. 11, 1952 G. P. PRATHER 2,617,404

GAS STOVE WITH BURNER AND COMBUSTION CONTROL ASSEMBLY

Filed Feb. 28, 1946 6 Sheets-Sheet 2

Fig. 2.



INVENTOR
Graham P. Prather
BY J. A. Guier
ATTORNEY

Nov. 11, 1952 G. P. PRATHER 2,617,404

GAS STOVE WITH BURNER AND COMBUSTION CONTROL ASSEMBLY

Filed Feb. 28, 1946 6 Sheets-Sheet 3

Fig. 3.

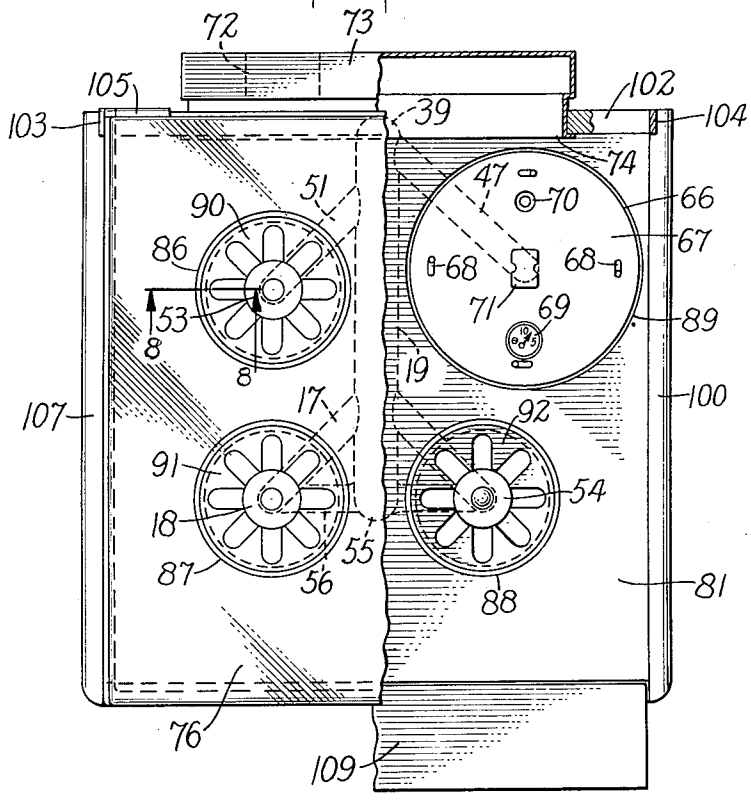
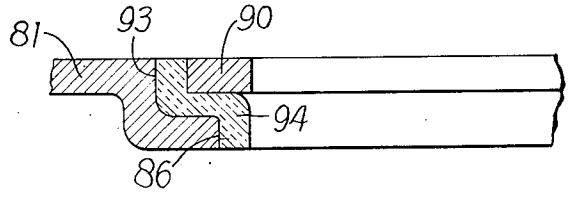


Fig. 8.



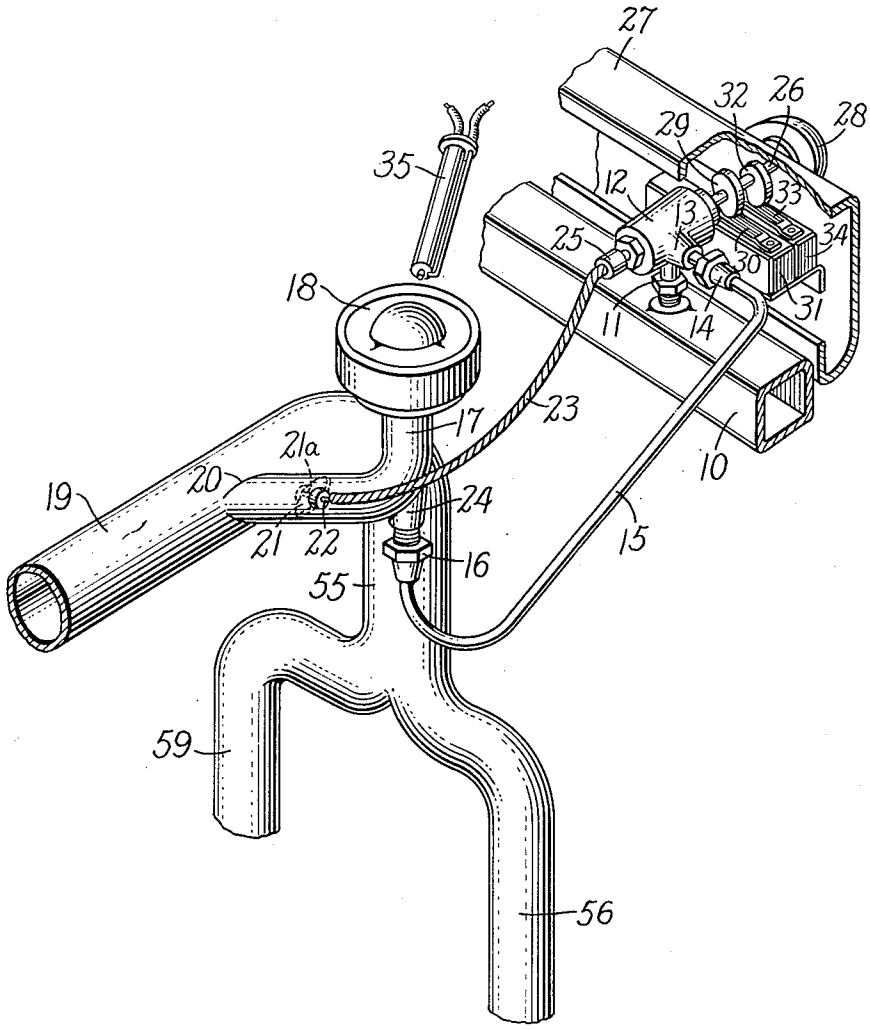
INVENTOR
Graham P. Prather
BY J. A. Grier
ATTORNEY

Nov. 11, 1952 G. P. PRATHER 2,617,404

GAS STOVE WITH BURNER AND COMBUSTION CONTROL ASSEMBLY

Filed Feb. 28, 1946 6 Sheets-Sheet 4

Fig. 4.



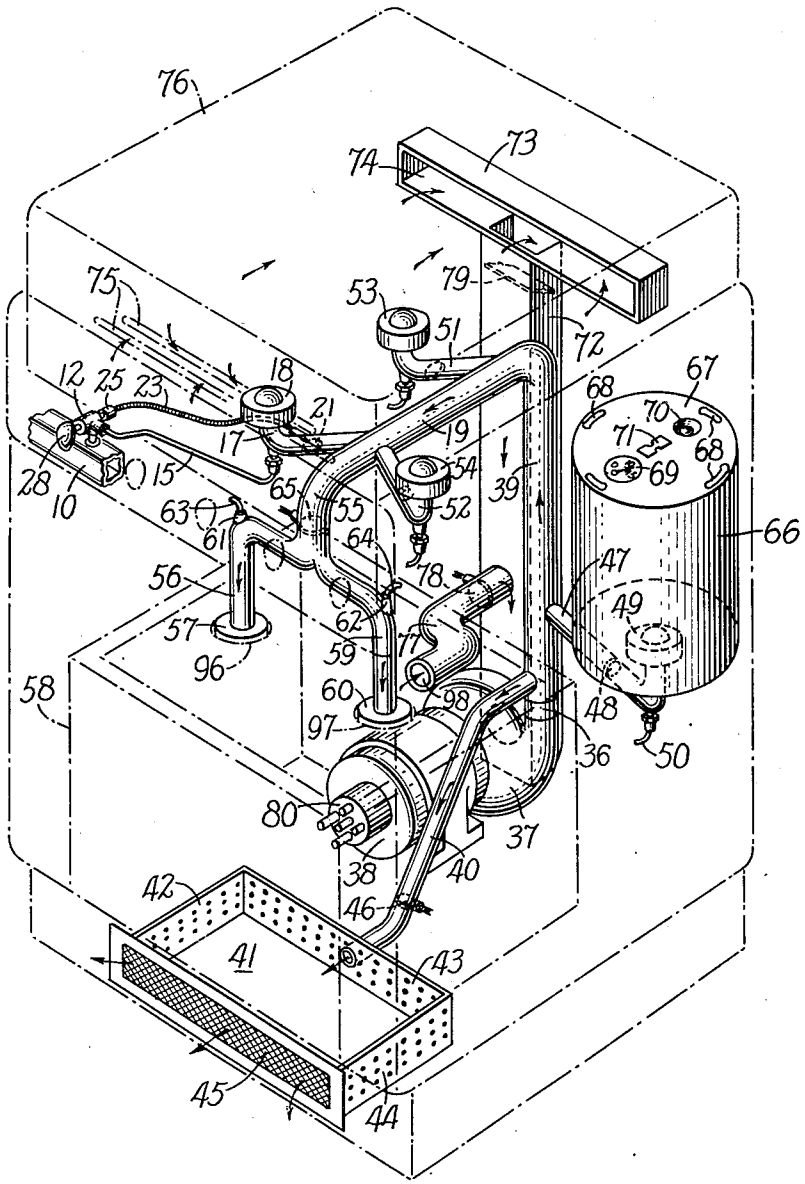
INVENTOR
Graham P. Prather
BY
J. A. Greer
ATTORNEY

Nov. 11, 1952 G. P. PRATHER 2,617,404

GAS STOVE WITH BURNER AND COMBUSTION CONTROL ASSEMBLY

Filed Feb. 28, 1946 6 Sheets-Sheet 5

Fig. 5.



INVENTOR
Graham P. Prather
BY J. A. Grier
ATTORNEY

Nov. 11, 1952 G. P. PRATHER 2,617,404

GAS STOVE WITH BURNER AND COMBUSTION CONTROL ASSEMBLY

Filed Feb. 28, 1946 6 Sheets-Sheet 6

Fig. 6.

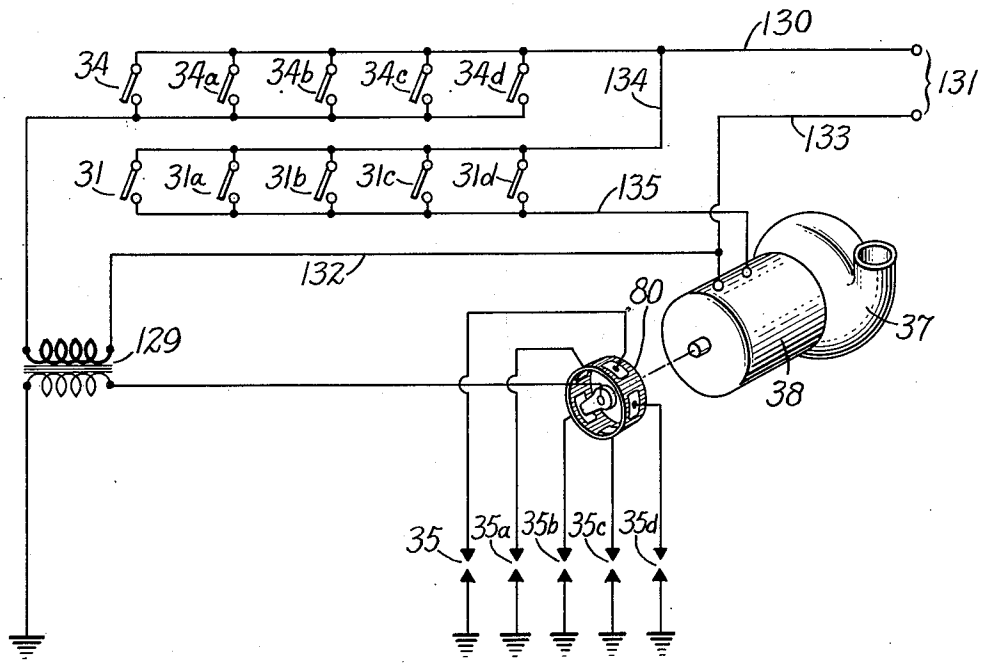
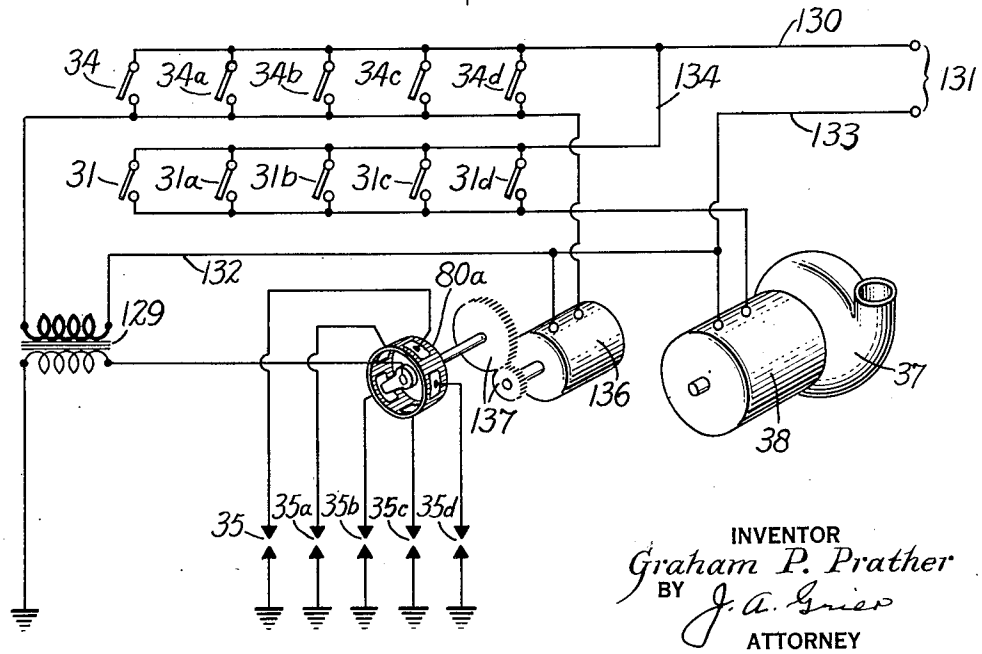


Fig. 7.



INVENTOR
Graham P. Prather
BY J. A. Grier
ATTORNEY

Patented Nov. 11, 1952

2,617,404

UNITED STATES PATENT OFFICE

2,617,404

GAS STOVE WITH BURNER AND COMBUSTION CONTROL ASSEMBLY

Graham P. Prather, Teaneck, N. J., assignor to J. A. Grier, New York, N. Y.

Application February 28, 1946, Serial No. 650,767

8 Claims. (Cl. 126—39)

1

This invention relates to improvements in stoves and is directed more particularly to the provision of a novel gas stove or range with improved features conducive to giving the best results in line with the trend in modern kitchens.

Another object of the invention is the provision in a gas stove of burners utilizing gas from the gas main, and thoroughly mixing the same with air from a pump or blower.

Yet another object of the invention is the provision, in a gas range, of a burner, means to deliver air under pressure thereto, a source of gas, a cock for controlling the supplying of gas to said burner, a handle for controlling said cock for conjointly controlling the delivery of air to said burner from said source.

A further object of the invention is the provision in a gas stove of a burner, a gas cock, and a handle for controlling the delivery of gas to the burner, the delivery of air to said burner and adapted also to control the electrical ignition of the mixture of gas and air delivered to the burner, thereby eliminating the continuous burning of gas by a pilot light and the attendant difficulties encountered in the use of pilot lights.

Another object of the invention is the provision, in a gas range, of novel oven construction, utilizing a minimum quantity of gas, and obtaining from said gas the greatest possible B. t. u.'s and retaining and conserving them to a greater degree than has heretofore been possible in gas ovens. My novel oven is so arranged that when it is opened, the contents and the shelves supporting said contents are accessible from opposite sides of the door.

Other objects and advantages of the invention will be apparent to those skilled in the art after a study of the drawings and the specification contained herein.

Referring to the drawings:

Fig. 1 is a sectional side elevation of my new and improved gas stoves as seen along the lines 1—1 of Fig. 2;

Fig. 2 is a front elevation, partly in section;

Fig. 3 is a plan view of my range with the right half of the transparent cover omitted;

Fig. 4 is a perspective view showing the arrangement of the air manifold, the burner, and the conjoint control of the gas, the air, and the electrical ignition;

Fig. 5 is a diagrammatic view in perspective showing the motor driven blower, together with its inlet and discharge manifolds and their relation to each other and to other elements in my device.

2

Fig. 6 is a wiring diagram of the gas cock switches, the ignition plugs, the distributor, and the blower motor;

Fig. 7 is an alternate wiring diagram of the electrical instrumentalities of the range; and

Fig. 8 is a fragmentary cross-sectional elevation taken along the line 8—8 of Fig. 3 showing the method of insulatingly supporting the grilled discs above the respective burners.

Referring first to Fig. 4, the main gas manifold 10 has connected thereto an inlet branch 11 of a valve or gas cock 12. The outlet branch 13 is connected by means of a fitting 14 to a length of tubing 15, and the other end of the tubing carries a fitting 16 which threadedly engages a gas inlet boss 24, the interior of which communicates with the burner air passage 17. The air passage has one end extending vertically and the burner 18 is mounted thereon. The other end extends outwardly from the air manifold 19 beginning at the point 20. The burner is preferably one of the radiant type.

A butterfly valve 21 is carried on a suitable shaft 21a in the air passage 17 and has connected thereto a flexible shaft 22 carried in a casing 23, which is connected by means of a suitable fitting 25 to the body of the gas cock 12 in alignment with the rotatable element therein, and the flexible shaft is connected to and rotates with the rotatable element. The fitting 25 also includes a stuffing box which permits the shaft 22 to be rotated without allowing gas to leak out. The rotatable element has a shaft 26 extending therefrom and projecting through a clearance hole in the trim plate or channel 27 and carrying a suitable handle 28.

A cam 29 mounted on the shaft 26 has in cooperative relation therewith a spring lever 30 which is, in turn, supported on a micro-switch 31. This micro-switch controls a motor-driven blower which will be presently described. The shaft 26 also has secured thereto a second cam 32 which cooperates with a spring lever 33 which is supported on a micro-switch 34, which controls the ignition current delivered to the ignition plug 35, as will presently be described.

When the handle 28 is rotated to turn the gas on and deliver it via the tubing 15 to the burner 18, the micro-switch 31 closes and starts a motor-driven blower into operation. This causes air to be delivered to the air manifold 19, and at least some of this air is delivered via the butterfly valve 21 to the passage 17 where it is mixed with the gas and the mixture passes on to the burner 18. The micro-switch 34 is also closed and the

primary of the ignition coil is energized, with the result that high tension current is distributed to the igniter plug 35, igniting the burner. The ignition coil and the method of distributing it to the igniter plugs will presently be described.

As stated above, the burner is of the radiant type and it will generate heat in accordance with the quantities of gas and air delivered thereto. As the handle 28 is turned to deliver more gas to the burner, the butterfly valve 21 is also turned to permit more air to be delivered to the burner, thereby insuring the proper mixture of gas and air at all settings of the handle 28.

Referring now to Fig. 5, the manifold 19 is part of a blower 37. An electric motor 38 has its shaft directly coupled to the rotating element of the blower. A conduit 39 extends vertically upward from the exhaust port 36 and joins the horizontally-extending manifold 19. A branch conduit 40, communicating with the conduit 39, extends into a compartment 41 having perforated sides 42, 43, 44, and a grill 45 on the front thereof. This compartment has an imperforate top (not shown) and bottom, and may be filled with any good dry deodorant, such as charcoal, carbon, etc. Within the conduit 40 is mounted a manually adjustable butterfly valve 46, whose purpose will presently be described.

Branching out from the conduit 39 is a conduit 47 which is provided with a butterfly valve 48, and which supports a burner 49. Gas is supplied to the burner 49, along with air from the conduit 47, via the tubing 50 from a gas cock just like the cock 12 above described. The butterfly valve 48 is controlled by a flexible shaft similar to the shaft 22, 23; and the burner 49 is ignited by an igniter plug similar to the one shown at 35 in Fig. 4.

Branches 51 and 52, respectively, are duplications of the passage 17 and they, respectively, support burners 53 and 54. They are provided with butterfly valves, gas tubes, and igniter plugs with a gas cock arrangement, just like that shown and described in Fig. 4, therefore, they need not be again described in detail.

A continuation 55 of the conduit 19, extending downwardly, is bifurcated; one portion 56 leading to a burner 57 for the oven 58, and a second portion 59 leading to a second burner 60 for said oven. A gas inlet boss 61 communicates with the interior of the portion 56, and a second gas inlet boss 62 communicates with the interior of the portion 59. Suitable tubular conduits 63 and 64 lead to a gas cock of suitable capacity and arranged like the one shown in Fig. 4, so that when it is turned on, gas is supplied to both the burner 57 and the burner 60. This last-mentioned gas cock may also have a flexible shaft connected to a buterfly valve 65 mounted in the portion 55.

The burners 18, 53, and 54 may be positioned just below the cooking top, to be described, the burners 57 and 60 may heat the oven, and the burner 49 may be positioned beneath a pressure cooker 66, having a removable top 67, suitable quickly disengageable top retainers 68, a pressure gauge 69, a safety valve 70, and a top-removing handle or clip 71.

The inlet port of the blower 37 has connected thereto a vertical rectangular conduit 72, having its upper end communicating with a horizontal elongated inlet port 73 having an open face 74 which, in the range, is in line with the space above the burners and the cooking top. When the blower is operated, air enters the slots 75 in the cooking top cover 76, passes over pots and/or cooking utensils thereon and together with the fumes and cooking odors passes into the inlet port 73, thence into the conduit 72 and into the blower 37. A conduit 77 has one end communicating with the interior of the conduit 72, and its other end 98 communicates with the oven 58 for leading cooking fumes from the oven to the blower.

Since all cooking fumes are delivered with the air to the blower, said fumes, together with the air, are mixed with the gas and are burned in the burners—resulting in the destruction of said fumes and odors.

The conduit 77 has a manually settable butterfly valve 78, and the conduit 72 is also provided with a manually settable damper or valve 79. When the range is assembled and tested, the settable valves 78 and 79 in the inlet conduits and the settable valve 46 in the discharge conduit 40 are adjusted until the air delivered to the burners is sufficient to form with the gas a perfectly combustible mixture for all settings of each burner.

The motor 38 may have mounted, on one end thereof, a distributor block 80, the rotor of which is rotated by the motor, either by direct drive or geared down, for distributing ignition current to the burner igniter plugs, thereby making it possible to effect the ignition of all of the burners from a single ignition coil. Each terminal on the distributor leads to the ignitor plug of a different burner, so that each time the distributor rotor makes a revolution, current for producing a spark is delivered to each igniter plug (provided the primary winding is energized). Now, when any given burner is turned on, its primary switch 34 closes the primary circuit of the ignition coil. At the same time, the switch 31 closes the motor circuit (provided the motor is not already running due to its having been started by the turning on of another burner which is still burning), and air is delivered with the gas to said given burner. The distributor sequentially delivers sparks to all of the igniter plugs (one of which is associated with said given burner) and the given burner is ignited. The sparks delivered to the burners which are not turned on, and/or to the burners already ignited have no effect and can do no harm.

As a modification, the distributor may be applied to a "flea power" motor with suitable reduction gear. This type of motor could also be controlled by the switches 34 as will presently be described in connection with Fig. 7.

Referring now to Figs. 1 and 2, the cooking top 81 consists of a rectangular plate member which rests on top angle irons 82, 83, 84, and an angle iron (not shown) oppositely disposed with respect to the angle iron 84 shown in Figure 2. It has three holes 86, 87, and 88, over the burners 53, 18, and 54, respectively, and a hole 89 through which the upper end of the pressure cooker 66 projects. The holes 86, 87, and 88 are stepped or countersunk to accommodate insulating rings 94, and the insulating rings 94 in turn support grilled discs 90, 91, and 92, respectively, thereby minimizing the heat transfer between the said discs and the plate member 81. The fragmentary view, Fig. 8, shows details of the insulating ring 94 with respect to the hole 86 and the grilled disc 90, and the others are identical. The top plate 81 is stepped so that above the hole 86 is a portion 93 of substantially larger diameter, and positioned in the portion 93 and in the hole 86

is a ring 94 of asbestos or any other suitable heat-resistant insulation. It is noted that the ring 94 is of Z-shaped cross-section, and that it rigidly supports the grilled disc above the burner, yet insulating said disc from and minimizing the heat transfer to the top plate 81.

Below, and adjacent to the cooking top plate are louvers 95, preferably in both sides of the range, and these louvers permit atmospheric air to pass upwardly and around the burners. Around the oven burner 57 is an annular opening 96, and around the oven burner 60 is an annular opening 97. These annular openings permit products of combustion to escape from the oven.

The right side 99 of my improved range has a portion 100 extending upwardly from the cooking top 91, and a head 101 is formed therein to present a supporting ledge to the transparent cover 76. A corresponding extension 102 at the back of the range supports the inlet port 73. At each end of the extension are uprights 103 and 104 which are pivotally engaged by stud plates 105 and 106, respectively. The stud plates are secured to the transparent cover 76, so that they together with the uprights may constitute hinges for said cover. Siutable counter-balancing means (not shown) may be provided for the transparent cover so that very little effort is required to move it, and so that it will stay in any desired position.

The left side has a portion 107 extending upwardly from the cooking top, and a head 108 formed therein presents a supporting ledge to the transparent cover 76. In front the range has, extending above the cooking top, a panel 109 which may be hinged to the trim plate 27, so that it may be swung down as shown in Fig. 1.

The oven 58 may be made of any suitable material and provided with insulation. However, I prefer to make it of a material which is heat-resistant and at the same time a poor conductor of heat—a refractory material. It may be formed of one piece and vitrified. The oven door 110 may be formed of the same or a similar material, so that when closed the insulating effect retains the heat and conserves fuel. Spaced apart from the oven door 110 is an upright grilled support 111 spanned by a plurality of angle members 112, 113, 114, and 115. Secured to the door 110 is a second plurality of angle members 117, 118, 119, and 120 in alignment with said first slides. A base member 121 secured to the door 110 and to the support 111 maintains the two in rigid fixed relation to each other so that any pair of aligned angle members may support shelves, etc.

Also secured to the door, adjacent to opposite side edges thereof are slide members, one of which is shown at 122 in Fig. 1. These slide members are secured to the door 110 in any suitable manner and extend therefrom horizontally to engage cooperative channels rigidly secured on the outside sides of the oven 58, so that the oven door assembly may be freely slid to open and closed positions while grasping the handle 128. The front or open end of the oven is secured to the front wall 124 of the range by means of angle irons 125 and 126, and an angle iron 127 supports the back of the oven.

The wiring diagram, Fig. 6, shows microswitches associated with the several gas cocks and designated by numerals 34, 34*a*, 34*b*, 34*c*, and 34*d*. These switches all have one side connected in common to a cable 130 leading to one side of a current source 131, and their other sides are connected in common with one terminal of the primary of the ignition coil 129. The other primary terminal is connected to the other side of the source 131 by cables 132 and 133, and to one terminal of the blower motor 38. The blower control switches 31, 31*a*, 31*b*, 31*c*, and 31*d* are also associated with the several burner cocks. One terminal of each of these switches is connected in common to a wire 134, which is, in turn, connected to the wire 130. The other terminal of each of these switches is connected in common with a wire 135 which leads to the other terminal of the blower motor 38. The distributor 80 has its rotor connected to the shaft of the motor 38, and its segments are individually connected to the several igniter plugs 35, 35*a*, 35*b*, etc. One end of the ignition coil secondary is connected to the distributor rotor and the other is grounded.

The wiring diagram, Fig. 7, is identical with that shown in Fig. 6, except that the distributor 80*a* is driven by a "flea power" motor 136 through reduction gearing 137, instead of being driven by the blower motor. The motor 136 has its terminals connected in parallel with the primary of the ignition coil so that, as long as said primary is energized, the motor 136 will run. In using switches 34, 34*a*, etc., the cam on each gas cock turns the current on to the primary and the motor 136 and high tension ignition current is distributed to all of the ignitor plugs 35, thus ignition is supplied each time a gas cock is turned on.

Although I have herein shown and described, by way of example, one embodiment of the invention, it is understood that many changes may be made in the arrangements shown and described without departing from the scope of the invention as defined by the appended claims.

Having described my invention, what I claim is:

1. In a gas range, a motor-driven blower therein, a manifold extending from the discharge port of said blower, a cooking top, a burner operatively associated with said cooking top and supported on a branch duct extending from said manifold and communicating with the interior thereof, a butterfly valve in said duct and having a shaft extending through the wall thereof, a gas pipe in said range, a gas cock having a movable element therein for controlling the passage of gas therethrough and connected to said pipe, a conduit leading gas from said cock to said duct between said butterfly valve and said burner, and a flexible shaft connected to the movable element in said cock and to the shaft of said butterfly valve to cause them to move in unison, said burner and said cock being substantially in horizontal alignment.

2. In a gas range, a motor-driven blower therein, a manifold extending from the discharge port of said blower, a cooking top, a burner operatively associated with said cooking top and supported on a branch conduit extending from said manifold and communicating with the interior thereof, a butterfly valve in said conduit and having a shaft extending through the wall thereof, a gas pipe in said range, a gas cock having a movable element therein for controlling the passage of gas therethrough and having a vertical intake passage connected to said pipe, a conduit connected to a horizontal outlet duct of said cock for leading gas from said cock to said conduit between said butterfly valve and said burner, and a flexible shaft connected to the movable element in said cock and to the shaft of said butterfly

valve to cause them to move in unison, said burner and said cock being substantially in horizontal alignment.

3. In a gas burning device, a cooking top, a burner operatively associated with said cooking top, a gas cock mounted on a gas pipe adjacent to said front edge of said cooking top and adapted to be connected to a source of gas, a motor driven blower, a conduit leading from said blower and forming the main support of said burner, valve means in said conduit, a rotatable element of said gas cock adapted to be rotated to control the flow of gas to said burner, switch means on said member for controlling the supply of electrical current to said motor driven blower in synchronism with the flow of any gas to said burner, and flexible shaft means operatively connected to said element and to said valve means for regulating the quantity of air delivered to said burner in proportion to said quantity of gas delivered, said burner and gas cock being disposed on said device in substantially horizontal alignment with one another.

4. In a gas burning device, a burner, a gas cock to be connected to a source of gas, a motor driven blower, a conduit leading from the discharge port of said blower to said burner, valve means in said conduit, a rotatable member on said gas cock adapted to be rotated to deliver gas to said burner, flexible shaft means operatively connecting said rotatable member to said valve means, switching means connected in a circuit with the motor of said blower and a source of current, cam means on said rotatable member for closing said switching means and maintaining it closed as long as gas is flowing to said burner, an igniter plug, an ignition transformer having a primary and a secondary winding, distributor means to deliver high tension current from said secondary to said igniter, a switch in a circuit with said primary and a source of current, and a second cam means on said rotatable member for closing said switch to effect the ignition of said burner.

5. In a gas range, a cooking top, a motor-driven blower in the body of said range, a manifold extending upwardly from the discharge port of said blower, a burner supported on a branch conduit leading from said manifold and communicating with the interior thereof, said burner being operatively associated with said cooking top, a butterfly valve in said conduit and having a shaft extending through the wall thereof, a gas pipe in said range, a gas cock having a movable element therein for controlling the flow of gas therethrough and having a vertical intake duct connected to said pipe, a conduit connected to a horizontal outlet duct of said cock for leading gas from said cock to said branch conduit between said butterfly valve and said burner, and a flexible shaft connected to the movable element in said cock and to the shaft of said butterfly valve to cause them to move in unison, said burner and said cock being substantially in horizontal alignment.

6. In a gas stove, a rigid conduit connected to a source of air, a second rigid conduit connected to a source of gaseous fuel, said conduits lying in planes which are angular with respect to each other, a burner mainly supported on said first conduit, a gas cock having a rotor with shaft extensions on both ends thereof and having a body with inlet and outlet passages formed therein, said body being mounted on said second conduit with said inlet passage communicating with the interior thereof, an air regulator valve in said first conduit between said source and said burner, a third conduit substantially less rigid than said first conduit and of substantially less cross-section than said second conduit, said third conduit being connected between said outlet passage and to said first conduit between said regulator valve and said burner, a flexible shaft connected to one of said shaft extensions and to said air regulator valve, and a handle on the other of said shaft extensions for rotating said rotor directly and for rotating said air regulator via said flexible shaft.

7. In a gas stove, a cooking top, a front plate adjacent to said top; a main gas manifold located near the front edge of said cooking top and extending adjacent to, parallel to, and rearwardly of, said front plate, and adapted to be connected to a source of gas; a gas cock operatively associated with said cooking top and mounted on said manifold, said gas cock having a rotatable element with a shaft extending through said front plate and with a second shaft extending rearwardly, said cock having a port communicating with the interior of said manifold, an air conduit connected to a source of air and having a branch thereof forming the main support of a gas burner, said burner being operatively associated with said cooking top, a valve in said branch adjacent to said burner, a fitting connected to said branch between said valve and said burner, a conduit extending from said fitting to a port of said gas cock for delivering gas into an isolated portion of said branch defined between said valve and said burner, and a flexible shaft extending from said second shaft to said valve for moving the latter in unison with the rotation of said rotatable element.

8. In a gas range, a motor blower system for supplying air to burner elements in said range, an electric ignition system including an igniter plug for each of said burner elements and including a single ignition transformer and means to distribute ignition current therefrom to produce sparks at all the igniter plugs sequentially, a plurality of gas cocks for selectively supplying fuel to said burner elements, and separate means cooperating with each of said gas cocks for conjointly initiating and stopping the operation of both said blower system and said ignition system when a selected one of said gas cocks is opened or closed respectively.

GRAHAM P. PRATHER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,344,136	Kobe	June 22, 1920
1,361,263	Jacobsen	Dec. 7, 1920
1,493,919	Cunningham	May 13, 1924
1,655,246	Schermuly	Jan. 3, 1928
1,701,500	Keith	Feb. 12, 1929
1,735,806	Struble	Nov. 12, 1929
2,064,347	Kahn et al.	Dec. 15, 1936
2,127,445	Hardgrove	Aug. 16, 1938
2,182,106	Ames	Dec. 5, 1939
2,402,429	Moecker et al.	June 18, 1946