(No Model.) 3 Sheets—Sheet 1.

# W. G. MILLER, W. H. BRADLEY & A. W. MILLER.

## STOVE AND RANGE AND ATTACHMENT FOR STOVES.

No. 544,048. Patented Aug. 6, 1895.

Fig. 1

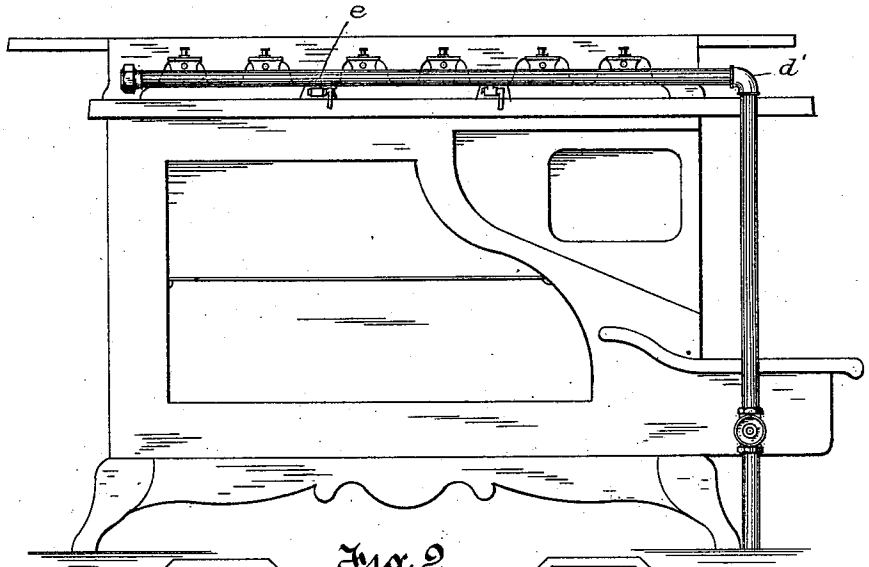
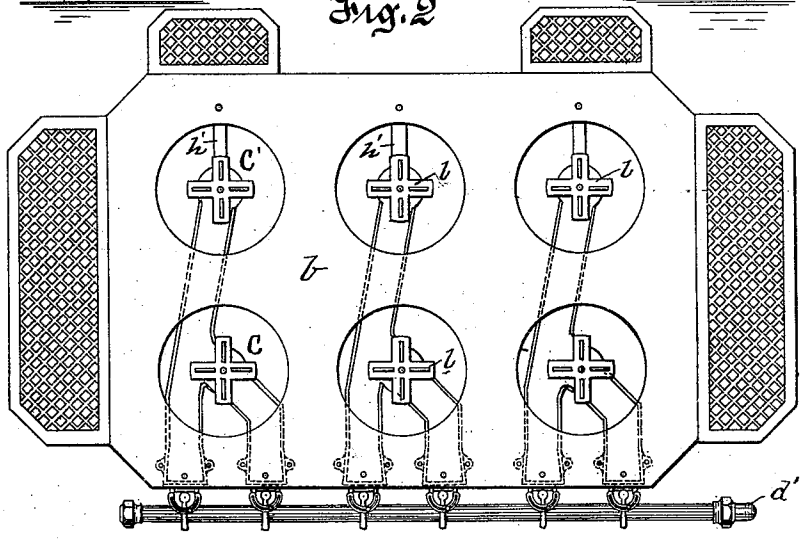



Fig. 2



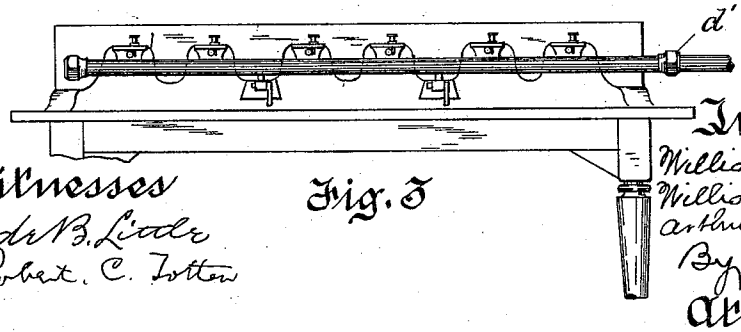




Fig. 3

Witnesses
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(No Model.) 3 Sheets—Sheet 2.

# W. G. MILLER, W. H. BRADLEY & A. W. MILLER.

## STOVE AND RANGE AND ATTACHMENT FOR STOVES.

No. 544,048. Patented Aug. 6, 1895.

Fig. 4

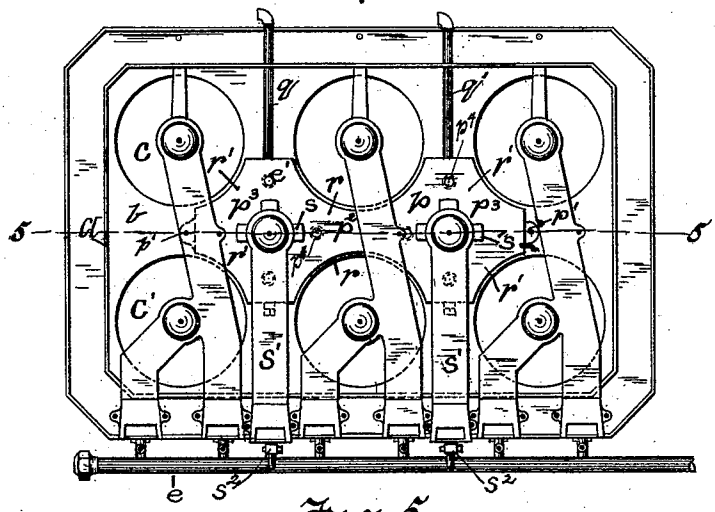
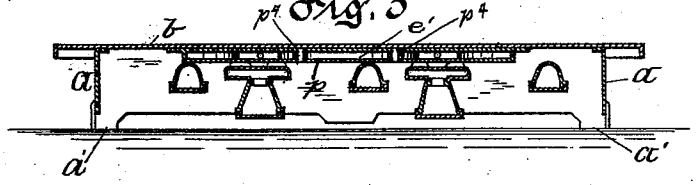



Fig. 5



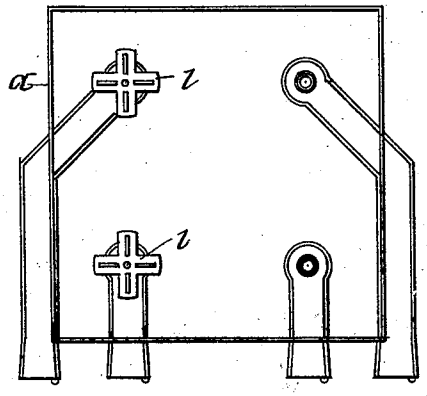




Fig. 13

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(No Model.) 3 Sheets—Sheet 3.

# W. G. MILLER, W. H. BRADLEY & A. W. MILLER.

## STOVE AND RANGE AND ATTACHMENT FOR STOVES.

No. 544,048. Patented Aug. 6, 1895.

Fig. 6

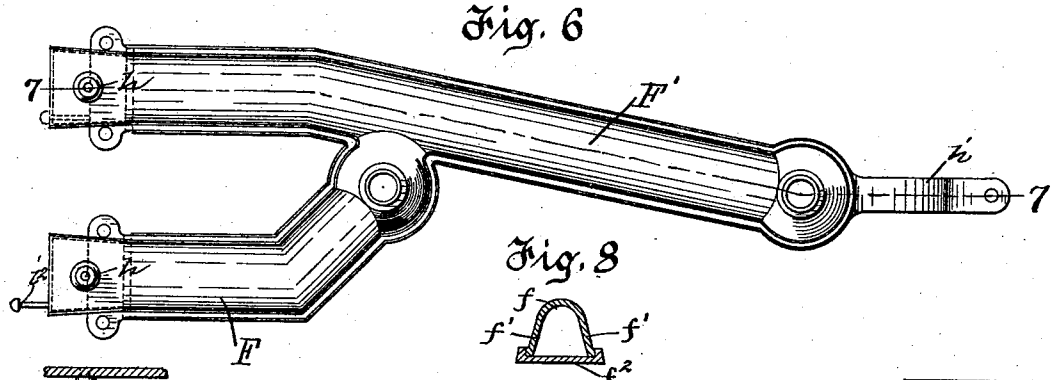



Fig. 8




Fig. 7

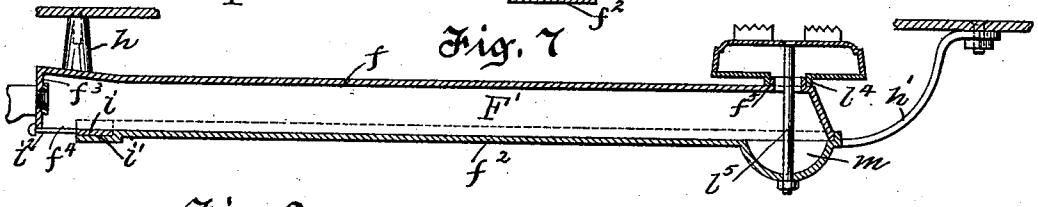



Fig. 9

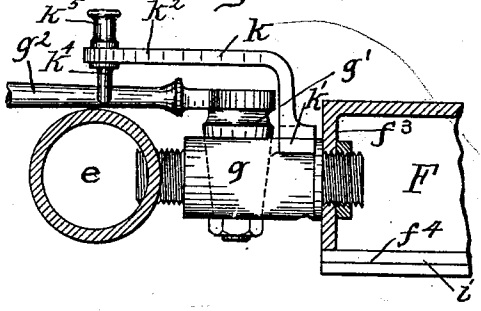



Fig. 12

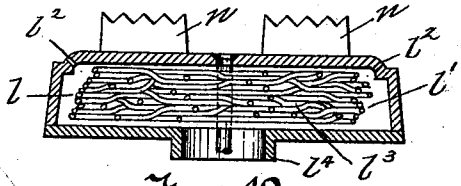



Fig. 10

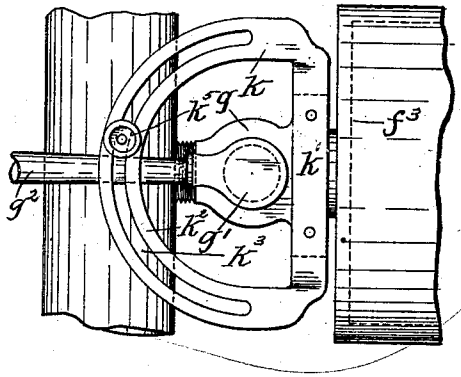
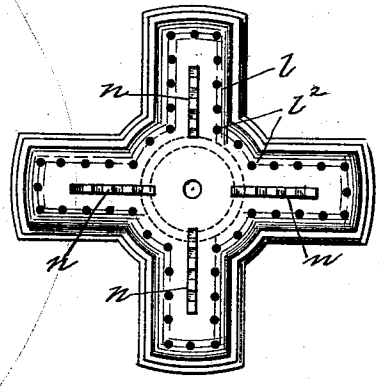



Fig. 11




Witnesses
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# UNITED STATES PATENT OFFICE.

WILLIAM GORDON MILLER, WILLIAM H. BRADLEY, AND ARTHUR W. MILLER, OF ALLEGHENY, PENNSYLVANIA; SAID BRADLEY AND ARTHUR W. MILLER ASSIGNORS TO SAID WILLIAM GORDON MILLER.

## STOVE AND RANGE AND ATTACHMENT FOR STOVES.

SPECIFICATION forming part of Letters Patent No. 544,048, dated August 6, 1895.

Application filed September 8, 1894. Serial No. 522,515. (No model.)

*To all whom it may concern:*

Be it known that we, WILLIAM GORDON MILLER, WILLIAM H. BRADLEY, and ARTHUR W. MILLER, residents of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Stoves and Ranges and Attachments for Stoves; and we do hereby declare the following to be a full, clear, and exact description thereof.

Our invention relates to portable cooking attachments or devices when used for gas which can be supported upon the ordinary cooking-stove; or, if it is desirable to employ gas instead of coal for cooking purposes in the heated summer months, it may be supported on any suitable table or on like supporting means. Its objects, briefly stated, are to improve this class of stoves as to the shape of the air and gas feeding pipes, to obtain a greater volume and better admixture without the necessity of employing pipes occupying too much space for the purpose, to so construct the pipes that they are properly braced in the frame of the stove, to provide means for heating the water in connection with the ordinary water-supply pipes and reservoir, and to improve the construction of the gas-burner applicable to that particular class of stoves or for other heating purposes.

The particular improvements desired to be covered will be hereinafter fully set forth and claimed.

To enable others skilled in the art to make and use our invention we will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a side view of the stove having the heating apparatus supported thereon. Fig. 2 is a top or plan view of the apparatus. Fig. 3 shows the apparatus supported on an ordinary table. Fig. 4 is a bottom view of the apparatus. Fig. 5 is a cross-section on the line 5 5, Fig. 4. Fig. 6 is a top view of the air and gas feeding pipes. Fig. 7 is a longitudinal section on the line 7 7, Fig. 6. Fig. 8 is a cross-section of the air and gas feeding pipes. Figs. 9 and 10 are detail views of the gas-valve and connections between it and the gas and air feeding pipes. Fig. 11 is an enlarged plan view, and Fig. 12 an enlarged section, of the gas-burner. Fig. 13 is a plan view showing another arrangement of the pipes leading to the different openings in the top of the stove.

Like letters of reference indicate like parts in each.

The apparatus is to be supported upon either the ordinary stove, for which it is substituted in hot weather, so as to do away with the heat from the stove or for which it may be substituted even in cold weather when a good supply of gas may be obtained, the stove being employed for cooking with solid fuel only. The gas-stove itself may, however, be supported upon a suitable table, as shown in Fig. 3, and it is the same construction in either case.

The stove is formed of the frame *a*, having suitable legs *a'*, by which is supported the top plate *b*, which has any desired number of cooking-openings *c c'* therein. The stove shown in the main figures of the drawings has six such openings. Extending along one side of the gas-stove is the gas-supply pipe *e*, which communicates with the regular gas-supply system by either a flexible or rigid pipe, as desired, it being preferred, however, to employ rigid pipe-coupling *b'* especially where the water-heating tank *e'*, hereinafter referred to, is employed for heating the water in connection with the regular hot-water system of the house.

The above parts may be of any desired construction, as the present invention does not especially lie in connection with the same, but in the other parts, which will now be described.

In carrying the gas to the different burners located centrally of the cooking-openings or to the water-heating tank, we find that by the employment of the peculiar shape of pipe (illustrated more particularly in Figs. 6, 7, and 8) we are enabled to obtain a much better result in the burning of the gas, and at the same time economy of space, as compared with the ordinary cylindrical tubing heretofore employed for the purpose, which would have the same carrying capacity. It will be noticed that the said air and gas feeding pipes

are practically semicircular, or, if the term may be used, "semicylindrical" in cross-section, having curved upper portion $f$ and the straight side walls $f'$ leading down to the flat base $f^2$. These parts are preferably cast to shape in two parts, the flat base $f^2$ forming one part, while the curved top and side walls form the other part, the whole being firmly secured together by sealing or like means along the joints of the pipes. It is found in practice that where pipes of this peculiar shape are employed a much higher heat is obtained in proportion to the amount of gas employed, which is believed to arise from the fact, first, of the greater capacity in proportion to the height of the pipe, and, second, on account of the greater surface area thereof, which absorbs the heat thrown down from the burners or the article being heated and assists materially in heating the air and gas passing through the tube. In such case the valve $g$ communicates with the end wall $f^3$ of the feeding-tube and an air-entrance $f^4$ is formed below such end wall, which is controlled by the flat sliding valve $i$, which fits in a seat $i'$ formed therefor at the forward end of the tube, the position of such valve being regulated by the handle $i^2$, according to the quantity of air desired to enter the feeding-tube. These pipes may lead in any desired way to the cooking-openings of the gas-stove; but for the ordinary stove the form of casting illustrated in Figs. 6 and 7 is found preferable, the casting having at the forward end the pillar $h$, which extends up to the bottom of the top plate $b$ and is secured thereto by a screw passing through the top plate, while at the other end of the casting is the arm $h'$, which extends up to the under surface of the plate $b$ and is secured thereto by a suitable bolt or screw, and, as illustrated in the main figures of the drawings, there are two cooking-openings $c$ $c'$ in line with each other. We find it desirable to employ a casting such as shown in Figs. 2, 4, and 6, in which the casting forming the feeding-tube for the cooking-opening $c$ nearest the gas-valve joins to the tube leading to the cooking-opening $c'$ farthest away from the valve, forming a casting corresponding substantially to the letter "h"—that is, having one part extend back beyond the juncture of the two tubes and two arms leading forward to the points where the valves connect thereto. The tube F leads to the burner nearest to the valve and the tube F′ to the burner farthest from the valve, both tubes having at their forward ends a pillar $h$, while a single arm $h'$ at the end of the tube F′ serves as a means for securing the same in place. This peculiar form of air-feeding tubes, both as to its section above described and as to the casting of the two tubes together, is applicable for use with any suitable cooking-range, such as the ordinary coal-range, in which such tubes are inserted when gas is to be employed therein.

It is a well-known fact that each burner of a gas-stove requires special regulation both as to the amount of gas used and amount admitted and that even though a greater volume of gas is fed thereto no greater heat is obtained, so that it is desirable to provide a regulating means or adjustable stop to control the amount of gas admitted to any one burner. For this purpose we employ the valve more especially shown in Figs. 9 and 10, in which the valve-body $g$ is secured to the end wall of the air-feeding pipe and itself communicates with the gas-pipe $e$, the rotary valve $g'$ being secured in the valve-body $g$ and having the handle $g^2$ extending out in convenient position for use, as more especially shown in Fig. 2. In order, however, to regulate the movement of the valves and form an adjustable stop to control the same, we provide the bracket $k$, secured to the valve-body $g$ at $k'$ in any suitable way and extending up above the valve-handle and having a semicircular portion $k^2$, under which the valve-handle $g^2$ moves, and in which semicircular portion is formed the semicircular slot $k^3$. In this slot is mounted the adjustable stop-piece $k^4$, which extends up through the semicircular slot and on which a thumb-nut $k^5$ screws, so as to fasten the stop-piece $k^4$ at any desired position in the slot $k^3$. There is thus provided for each burner an adjustable stop which regulates the widest open position of the burner, so as to control the same and prevent the flow of too great an amount of gas to the burner, so that the use of the gas-stove by the domestic can be watched over by the housewife.

The gas-burner $l$ (illustrated in the drawings) is believed to be applicable not only to gas-stoves, but to any grate or other place at which gas is to be burned, though it is especially adapted for use in connection with the form of air and gas supply tube illustrated in the drawings. We will now describe the same in detail, and then describe its use. It is preferably made in the form of a cross, as shown particularly in Fig. 11, and has the hollow interior chamber $l'$ and the gas-outlets $l^2$ at about the juncture of the top wall and side walls of the burner, the gas-outlets following substantially the shape of the burner and so permitting the air passing up around the cross-shaped burner to unite with the mingled gas and air passing from the burner itself and assist in the combustion of the gas. The gas-burner by being of cross shape distributes the flame more evenly over the surface of the vessel to be heated instead of leaving the central part of that vessel out of contact with the flame, which is the case in the ordinary circular burner, and in a burner of like diameter provides for a larger number of gas-outlets and permits access of the air rising around the burner to such gas-outlets near the center of the burner, all such features being valuable in connection with the perfect combustion of the gas. It will also be noticed that within the burner itself, or within

the chamber *i* thereof, is a certain filling material $l^3$, this filling material being composed of a conglomerate mass of loose heat-conducting metal, such as copper wire, filings, or scraps of other suitable metals which have interstitial passages, and which will quickly absorb and give off the heat arising from the burning of the gas as it passes from the burner. By the use of such filings of loose heat-conducting metal we are enabled to heat the gas and air passing to the burner from the feeding-tube before it passes out through the burner, the gas and air having been partially heated by passing through the peculiarly-shaped feeding-tube above referred to; but as it passes into the burner *l*, which is so filled with the loose heat-conducting metal, practically every molecule of gas and air must pass in contact therewith, and it is necessarily heated very considerably before it passes from the burner, with the result of aiding the perfect combustion of the gas with both the heated air passing through the feeding-tube and the air rising around the burner, it being found that a practically-perfect combustion of the gas is obtained. It is also to be noticed in connection with this question of the burning gas that below the gas-burner is a depressed circulating-chamber with which the feeding-tube communicates, this chamber *m* being formed as part of the casting of the feeding-tube and extending out from the flat bottom wall $f^2$ of such tube, the chamber *m* extending below the body of the tube, and by increasing the space directly below the burner providing for the circulation of the incoming gas and air therein, causing the passage of the same in an even course up into the burner; also holding the incoming gas and air in such circulating-chamber, or checking its rapid flow, so that by contact with the walls of such circulating-chamber *m*, both of which are heated, a further means of heating the incoming gas and air is provided. It will be seen that when in use for gas-stoves the burner *l* has a socket $l^4$, which fits around a socket $f^5$ on the feeding-tube, and a bolt $l^5$ passes through the burner itself and down through the feeding-tube, extending through the base of the depressed circulating-chamber *m*, the two parts being thus bolted together.

For the purpose of supporting the vessel above the gas-burner *l* we form in the body of the burner the ribs *n* extending radially—that is, longitudinally of each arm of the cross of the burner—which ribs extend above the same for the proper height for the support of the vessel and so provide for the support of any small article without the necessity of a skeleton frame extending from the outer edge of the openings in the top over the burner, as usually employed. The lid of the stove is so arranged that it will pass over such supporting-ribs when it is desired to employ the lids, such as for slow cooking operations.

Where the stove is employed for city houses either as a summer-stove or for permanent use, it is very desirable that means for heating the water in the regular water-supply system should be provided. The ordinary stove or range has for this purpose a water-back, while the regular gas-stove has a coil of pipe. It is very desirable, however, in a shallow stove, adapted to rest on a range or table such as illustrated in the drawings, to provide an efficient means for heating the water, and this we accomplish by the employment of a water-heating tank extending under the top plate and secured thereto and one or more burners under the tank for heating the same. This is more particularly shown in the bottom view of the apparatus, Fig. 4, and cross-section, Fig. 5, where it will be seen that the water-heating tank is a flat shallow tank, which conforms in shape to the top plate *b* and to the burner-openings *c c'* therein, and which is secured to the top plate by bolts *p'*. The induction and eduction pipes *q q'* lead from the ordinary water-reservoir to this water-heating tank, and suitable pipe connections can be made at small cost from the reservoir to the water-heating tank. It will be seen that where the water-heating tank *p* is employed with a six-burner stove it has in its sides the semicircular recesses *r*, forming a narrow passage $p^2$ between the two main chambers $p^3$ of the tank, through which the water must necessarily pass in its course between the induction and eduction pipes, and also that in order to obtain as great a heating-surface as possible without interfering with the burner-openings *c c'* the ends of the water-tank are formed on curves, as at *r'*, a large heating-surface in the tank being obtained sufficient to heat all the water necessary for ordinary domestic purposes without interfering in any way with the ordinary cooking operations of the stove. To heat the water-tank we employ one or more special burners *s*, and special feeding-tubes *s'*, and special gas-valves $s^2$, by which the supply of gas to such burners will be regulated. It will be noticed that one such burner is made under each main chamber $p^3$ of the water-heating tank, and that on account of the flat lower surface of the tank efficient means for heating the water is provided. The heating-tank may be provided with the heating-flues $p^4$. To obtain a greater heating-surface the walls of the water-heating tank may, if desired, be corrugated, though that is not necessary.

While it is preferred that the air and gas feeding tubes be arranged as shown in the main figures of the drawing, any other suitable arrangement may be employed, such as shown in Fig. 13, in which the tube leading to the cooking-openings *c'* farthest from the valves are made separate from those nearest said valves and extend along the frame *a*, and thence at an angle to the cooking-opening. This figure is added to show that the special construction of burner and of feeding-tubes may be employed in different ways.

When the stove is in use the air enters

through the port $f^4$ controlled by the valve $i$ of any separate feeding-tube $f$ or $f'$, the gas entering above such feeding-openings acting as an injecting means and inducing the current through the feeding-tube, with the result that the gas and air pass together along the tube to the burner. On account of the increased suction of the tube above referred to the gas and air become more intimately intermingled, and a larger proportion of air is carried in with the gas, and the air and gas first pass into the depressed circulating-chamber $m$, circulate in the same, and then pass upwardly into the chamber $l'$ and through the burner-openings $l^2$. As soon as the burner and tubes are heated by radiation and induction it is evident that the feeding-tubes themselves, as well as the walls of the burner itself and the loose heat-conducting metal within the burner, become heated, and the incoming gas and air flow in contact with such conglomerate mass of heated walls and the heated metal within the chamber $l'$ of the burner and rise from the circulating-chamber $m$ to the burner, being in this way thoroughly intermingled with each other and heated, and on account of the circulating-chamber rising in an even course into the chamber $l'$ and flowing evenly to all the outlets $l^2$ of the burner, where it is ignited, the heating of the air and gas very materially aiding in the burning thereof and the air flowing around the cross-shaped burner uniting with that and flowing through the burner itself, so that a practically-perfect combustion of the air and gas from such burner, with a very material saving of gas, is effected. The gas and air can be regulated in the manner above described by the flat sliding valve $i$ and by the movement of the valve $g'$ in the valve-body $g$ and the point of best combustion in each burner can be quickly ascertained, and by means of the adjustable stop $k^4$ in the semicircular slot $k^3$ in the bracket $k$ the widest open position of the valve may be regulated and controlled by the housewife. By the separate burners the water may be heated in the chamber $p$ and one or more of the burners for heating the same may be kept burning continuously, as found necessary. In this way we are enabled to provide shallow-gas cooking-stoves which can be supported on a stove, table, or other suitable platform, and by which all ordinary cooking operations can be performed with economy of fuel, and a regular supply of hot water may be maintained, while the parts may be strong and are firmly braced together, so that the liability of the parts getting out of order is overcome.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination with a rotating gas valve having an arm extending out at one side, a horizontal bracket secured to the valve body and extending out in line with the valve handle and having a curved slot formed therein, and an adjustable stop in said slot in the course of the valve handle, substantially as and for the purposes set forth.

2. The combination with a rotating gas valve having an arm extending out at one side, a horizontal bracket secured to the valve body and extending out in line with the valve handle and having a curved slot formed therein, and an adjustable stop in said slot in the course of the valve handle, said stop extending through the slot in the bracket and having a thumb nut screwing thereon, substantially as and for the purposes set forth.

3. In combination with a stove top plate having circular openings therein, a water-heating tank, extending under the top plate, and secured thereto and having two main chambers and between the main chambers a passage for communication between the main chambers, the walls of which correspond to the circular openings of the top plate between the two main chambers, substantially as and for the purposes set forth.

In testimony whereof we, the said WILLIAM GORDON MILLER, WILLIAM H. BRADLEY, and ARTHUR W. MILLER, have hereunto set our hands.

WILLIAM GORDON MILLER.
WILLIAM H. BRADLEY.
ARTHUR W. MILLER.

Witnesses:
ROBERT C. TOTTEN,
L. DE B. LITTLE.