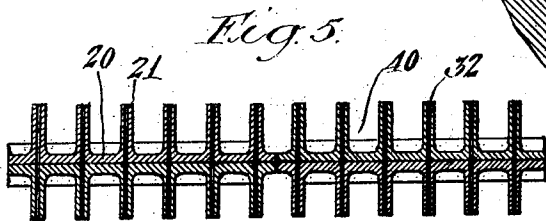
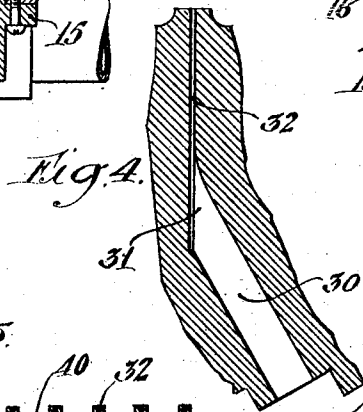
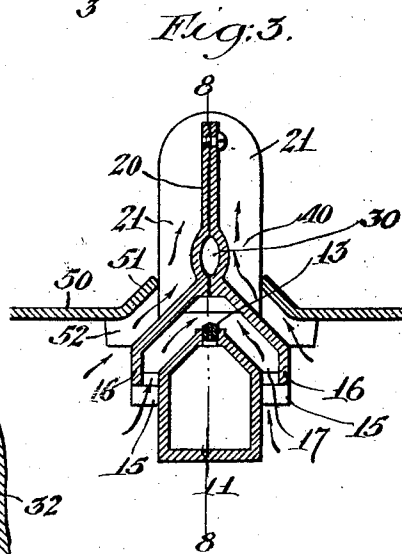
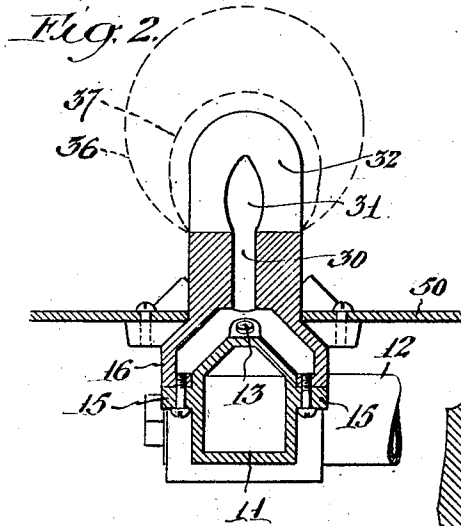
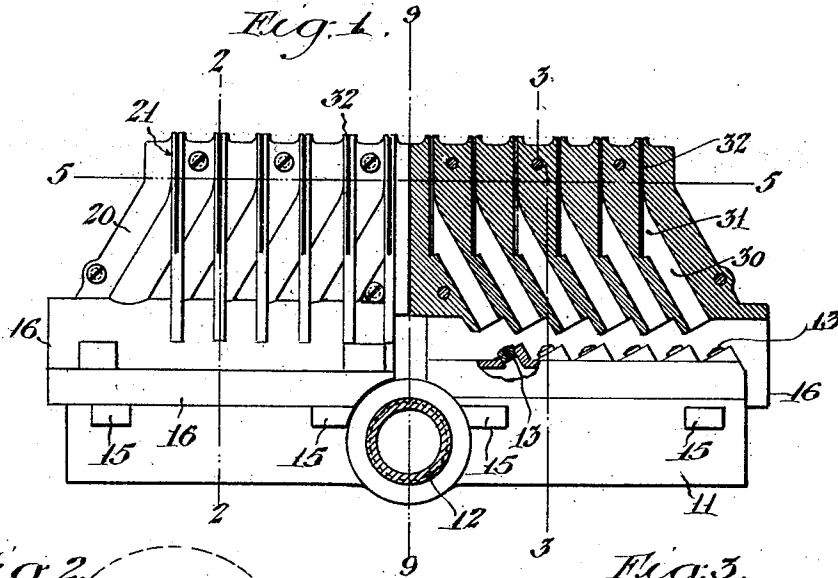


W. M. BRITTEN.  
GAS BURNER.  
APPLICATION FILED MAY 8, 1920.

1,406,925.

Patented Feb. 14, 1922.

2 SHEETS—SHEET 1.



Inventor  
William M. Britten  
by Graham Harris  
Attorneys.

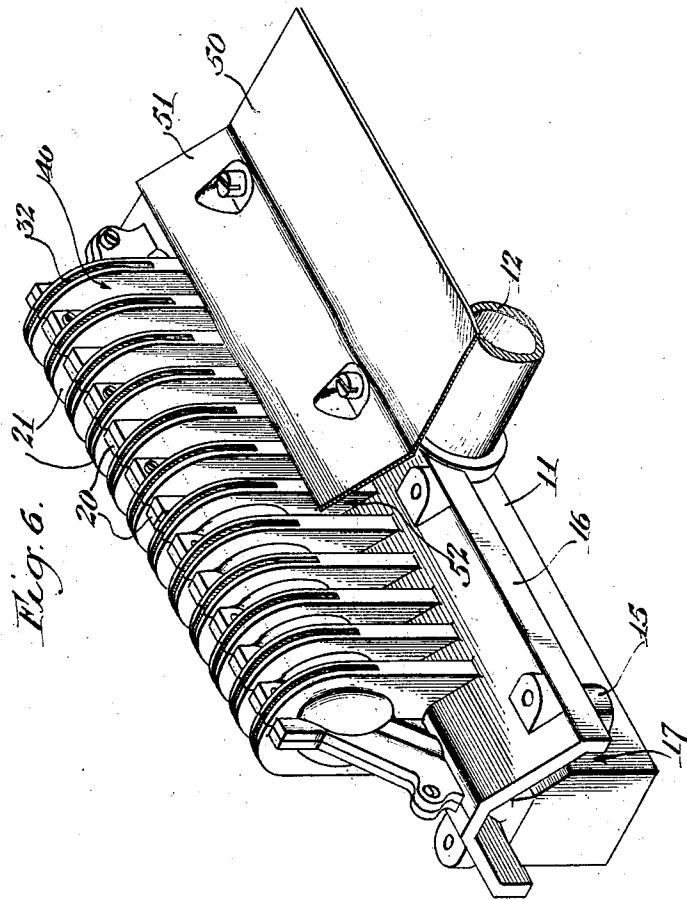
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*Inventor*  
*William M. Britton*  
*by Graham & Harris*  
*Attorneys.*

# UNITED STATES PATENT OFFICE.

WILLIAM M. BRITTEN, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-HALF TO  
CLYDE HARSHMAN, OF LOS ANGELES, CALIFORNIA.

## GAS BURNER.

1,406,925.

Specification of Letters Patent. Patented Feb. 14, 1922.

Application filed May 8, 1920. Serial No. 380,004.

*To all whom it may concern:*

Be it known that I, WILLIAM M. BRITTEN, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Gas Burner, of which the following is a specification.

My invention relates to gas burners which are commonly used in all sorts of gas heating appliances.

The principal object of my invention is to provide a burner in which the efficiency of combustion and the temperatures produced are extremely high.

A further object of my invention is to provide a burner in which the efficiency will not vary appreciably with widely varying gas pressures. It is comparatively simple to make a burner which will function properly for any given pressure, but it is an extremely difficult matter to make a high efficiency burner which can be used without adjustment on almost any commercial pressure and which will, therefore, be applicable to systems in which the pressure varies widely. It may be said that in many cities it is impractical to use many sorts of gas heating appliances due to the fact that the gas supply is variable and that during certain periods of the day, the pressure falls to very low values.

My invention comprises the novel combination and arrangement of parts set forth in the following specification and shown on the annexed drawings.

Referring to these drawings which are for illustrative purposes only,

Fig. 1 is a side elevation partly in section showing one embodiment of my invention.

Fig. 2 is a section on a plane represented by the line 2—2 Fig. 1.

Fig. 2 is a section on a plane represented by the line 3—3 of Fig. 1.

Fig. 4 is an enlarged view showing the arrangement of the tip, throat and slot.

Fig. 5 is a section on a plane represented by the line 5—5 of Fig. 1.

Fig. 6 is a perspective view of the burner, portions being broken away to better illustrate the structure.

In the embodiment of my invention shown a gas manifold 11 is provided, this manifold being supplied with gas through a gas inlet pipe 12. Secured in the top of the gas

manifold is a plurality of tips 13, these tips being arranged in two series, each of these tips being inclined at an angle of thirty degrees with the line 9—9 of Fig. 1. The tips in the series at the right of this line as viewed in Fig. 1, are oppositely inclined to the tips shown at the left of this line.

Secured on lugs 15 at either side of the gas manifold 11 are aprons 16, these aprons being spaced away from the gas manifold and leaving primary air inlet passages 17 between the gas manifold and the apron.

Secured to the apron 16 and held thereby above the tips 13 are flanges 20 which are joined to ribs 21.

The members 16, 20 and 21 are made in four quarters which are joined along the central line 8—8 of the burner and along a second central line 9—9. Formed in the members 20 and 21 are a series of throats 30, each of these throats being located on the center line of one of the jets 13. Each of the throats terminate in a slightly enlarged spreader chamber 31 which is in open communication with one of the slots 32. The slots 32 are each centrally located in one of the ribs 21 and form passages through which the combustible mixture emerges, the mixture being ignited and burning with a flame whose visible limits are shown by the lines 36 and 37 of Fig. 2.

It will be noted that open spaces are shown between the ribs 21, these spaces forming secondary air flues 40. In practice the burner projects into a combustion space having a bottom 50, the burner projects through a hole in this bottom and the bottom is turned up as shown in 51 to provide a secondary air inlet passage 52. The secondary air inlet passages 52 communicate with the bottom of the secondary air flues 40 and provide a ready means for supplying large quantities of secondary air directly to the flame produced by the burner. It will be noted that each of the flames is rather more than semi-circular and they are necessarily very flat.

It is a well known fact that the efficiency of combustion in any gas burner can be varied between wide limits by changing the thoroughness of the mixture of the gas and air.

It is a well known fact that where this mixture is very thorough, that a very high efficiency of combustion is possible and much

higher temperatures are produced than where ordinary mixing methods are employed.

I have further found that this intimate mixture can be produced by forcing a jet of mixed gases to impinge on a flat surface such as one side of a slot 32, at such an angle that the gases will not rebound from the surface, but will roll along same so that the scrubbing action of the surface will intimately mix the gases and produce a very perfect and intimate mixture of same.

I have further found that where the velocity is high that it is possible to cause such gases to impinge on such a surface and to pass over same and to burn at a point beyond the surface. If, however, the velocity is allowed to fall, the flame creeps back and finally burns on the surface which becomes highly heated so that there is great liability of flash-backs into the passages leading to this surface, thus possibly destroying the burner. For the purpose of preventing this, I have discovered that a second surface placed approximately parallel to the first surface and reasonably close thereto will prevent the gas from burning on this surface if the metal members are kept cool. It is essential, however, that the proportions of the parts be such that no material pressure is built up therein by the passage of the gas therethrough.

It is about the broad conception of mixing gases by their scrubbing action on a surface that my invention is constructed, one wall of each of the slots 32 forming the scrubbing surface and the other wall of the slot forming the cooling surface for preventing flash-backs into the burner.

My invention also comprises the conception of cooling both surfaces which I accomplish by the direction of the secondary air as described above. This absolutely prevents the mixture from burning between the surfaces or flashing back therethrough.

It will be noted that there are three mixing points for air and gas namely, in the throat 30, on the plate 32, and as the gases emerge from the slot 32. The proportions of the various parts are so arranged that there is always a partial vacuum in the chamber 31, the potential energy of the gas under pressure in the manifold 11 changing to kinetic energy in the throat 30 and appearing as a velocity. This velocity is sufficient to draw in primary air, mix this air with the gas, and project the mixture out of the slot without building up an appreciable pressure in any part. It is also to be noted that although the slots are quite thin that due to their circumferential disposition about the chambers 31, they constantly increase in sectional area along the line of motion of the gas.

The higher the pressure in the manifold

11, the greater the potential energy of the gas and the higher the velocity in the throats 30 and on the mixing plate. The higher this velocity the greater the vacuum in the chamber 31 and the more primary air that is drawn into the throat 30. The higher the velocity in the flame and the hotter the flame, the more secondary air that is drawn up through the spaces 40. It will thus be seen that the burner is self regulating maintaining a substantially uniform mixture under widely varying gas pressures.

What I claim is:

1. A gas burner comprising a gas manifold, a series of tips set in the top of said manifold and having jet openings communicating with the interior of said manifold, aprons secured on said gas manifold but spaced apart therefrom to form primary air inlet passages, flanges formed on said aprons, said flanges having throats formed therein, each of said throats being so placed that gas from one of said jets is projected into said throat where it joins primary air drawn inwardly through said passages; and a series of cooling ribs at right angles to said flanges, each of said ribs having a central slot therein, said slots each communicating with one of said throats which enters same at an angle.

2. A gas burner comprising a gas manifold, a series of tips set in the top of said manifold and having jet openings communicating with the interior of said manifold, aprons secured on said gas manifold but spaced apart therefrom to form primary air inlet passages, flanges formed on said aprons, said flanges having throats formed therein, each of said throats being so placed that gas from one of said jets is projected into said throat where it joins primary air drawn inwardly through said passages, and a series of cooling ribs at right angles to said flanges, each of said ribs having a central slot therein, said slots each communicating with one of said throats which enters same at an angle, the space between said ribs being cut away to form secondary air flues through which air rises to assist combustion and cool said ribs.

3. A gas burner comprising a gas manifold, a series of tips set in the top of said manifold and having jet openings communicating with the interior of said manifold, aprons secured on said gas manifold, but spaced apart therefrom to form primary air inlet passages, flanges formed on said aprons, said flanges having throats formed therein, each of said throats being so placed that gas from one of said jets is projected into said throat where it joins primary air drawn inwardly through said passages, and a series of ribs at right angles to said flanges, each of said ribs having a central slot therein, said slots each communicating at an an-

gle of substantially thirty degrees with one of said throats which enters same at an angle.

4. A gas burner comprising a gas manifold, a series of tips set in the top of said manifold and having jet openings communicating with the interior of said manifold, aprons secured on said gas manifold but spaced apart therefrom to form primary air inlet passages, flanges formed on said aprons, said flanges having throats formed therein, each of said throats being so placed that gas from one of said jets is projected into said throat where it joins primary air drawn upwardly through said passages, and a series of cooling ribs at right angles to said flanges, each of said ribs having a central slot therein, said slots each communicating at an angle of substantially thirty degrees with one of said throats which enters same at an angle, the space between said ribs being cut away to form secondary air flues through which air rises to assist combustion and cool said ribs.

5. A gas burner comprising a gas manifold, a series of tips set in the top of said manifold and having jet openings communicating with the interior of said manifold, aprons secured on said gas manifold but spaced apart therefrom to form primary air inlet passages, flanges formed on said aprons, said flanges having throats formed therein, each of said throats being so placed that gas from one of said jets is projected into said throat where it joins primary air drawn inwardly through said passages, and a series of ribs at right angles to said flanges, each of said ribs having a central slot therein, said slots each communicating with a spreader chamber formed in one of said flanges, each of said throats discharging into one of said spreader chambers.

6. A gas burner comprising a gas manifold, a series of tips set in the top of said manifold and having jet openings communicating with the interior of said manifold, aprons secured on said gas manifold but spaced apart therefrom to form primary air inlet passages, flanges formed on said apron, said flanges having throats formed therein, each of said throats being so placed that gas from one of said jets is projected into said throat where it joins primary air drawn upwardly through said passages, and a series of cooling ribs at right angles

to said flanges, each of said ribs having a central slot therein, said slots each communicating at an angle of substantially thirty degrees with a spreader chamber formed in one of said flanges, each of said throats discharging into one of said spreader chambers, the space between said ribs being cut away to form secondary air flues through which air rises to assist combustion and cool said ribs.

7. In a gas burner, the combination of: walls forming a throat of substantially uniform area; walls forming a slot of substantially uniform thickness, said throat being connected into one side of said slot at an angle to the sides thereof; and means for injecting a jet of gas under pressure into said throat.

8. In a gas burner, the combination of: walls forming a throat of substantially uniform area; walls forming a slot of substantially uniform thickness, said throat being connected into one side of said slot at an angle to the sides thereof; and means for injecting a jet of gas under pressure into said throat, said throat being open at its end opposite said slot to receive said jet and to receive air.

9. In a gas burner, the combination of: walls forming a throat; walls forming a slot of substantially uniform thickness, said throat being connected into one side of said slot at an angle to the sides thereof; and means for injecting a jet of gas under pressure into said throat; said throat being open at its end opposite said slot to receive said jet and to receive air.

10. In a gas burner, the combination of: a flat rib having a slot therein parallel to its long sides; walls forming a throat opening obliquely into said slot; and means for injecting a jet of gas into said throat so that it impinges obliquely on one wall of said slot.

11. In a gas burner, the combination of: a flat rib having a slot therein parallel to its long sides; walls forming a throat opening obliquely into said slot; and means for injecting a jet of gas into said throat so that it impinges obliquely on one wall of said slot in such a manner as to thoroughly mix said gas with air in said throat.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 30th day of March 1920.

WILLIAM M. BRITTEN.