Dec. 24, 1957 I. V. BRUMBAUGH 2,817,397

GAS BURNER HEAD HAVING RIBBED CAP MEMBER PROVIDED WITH PERIPHERALLY DRILLED PORTS

Filed April 10, 1951 4 Sheets-Sheet 1

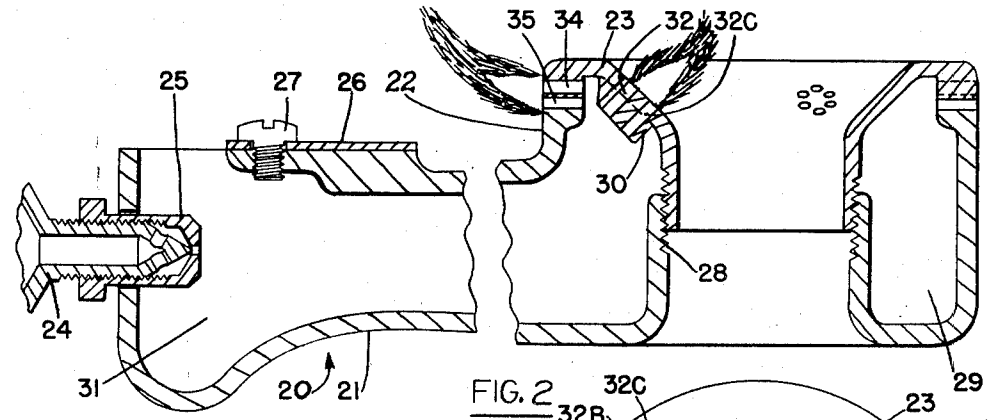


FIG. 2

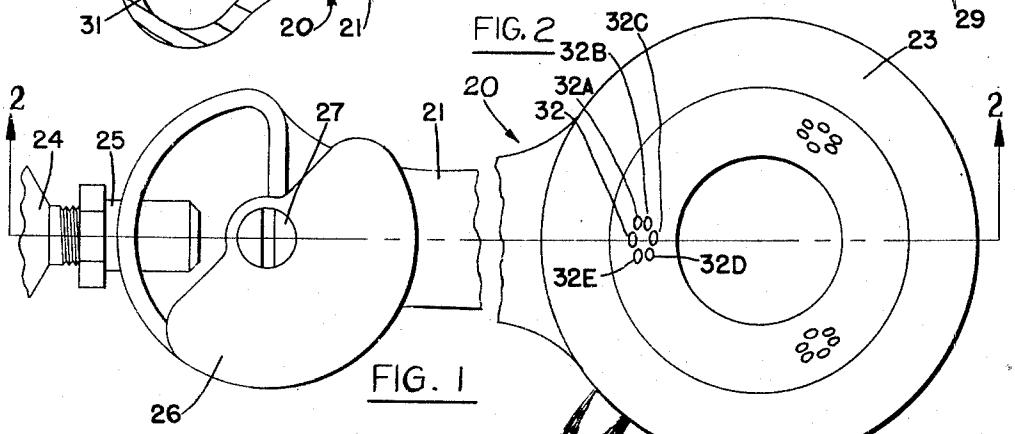


FIG. 1

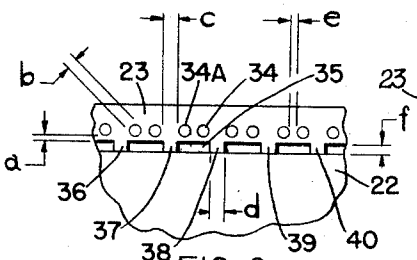


FIG. 3

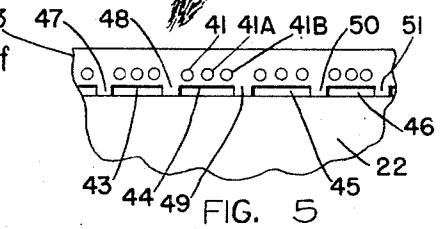


FIG. 5

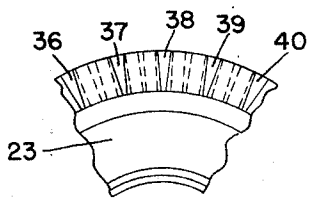


FIG. 4

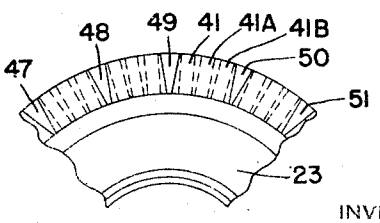


FIG. 6

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GAS BURNER HEAD HAVING RIBBED CAP MEMBER PROVIDED WITH PERIPHERALLY DRILLED PORTS

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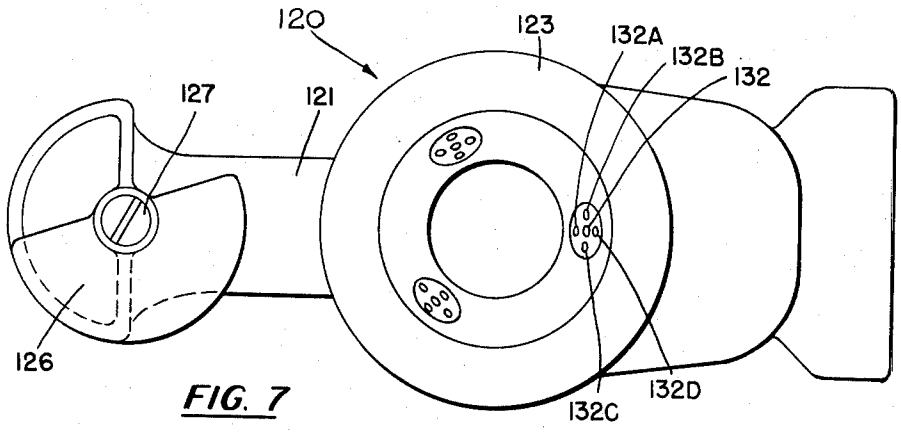


FIG. 7

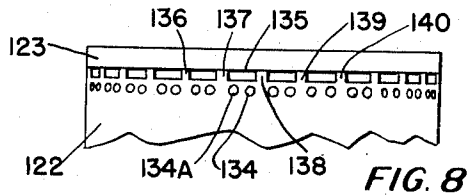


FIG. 8

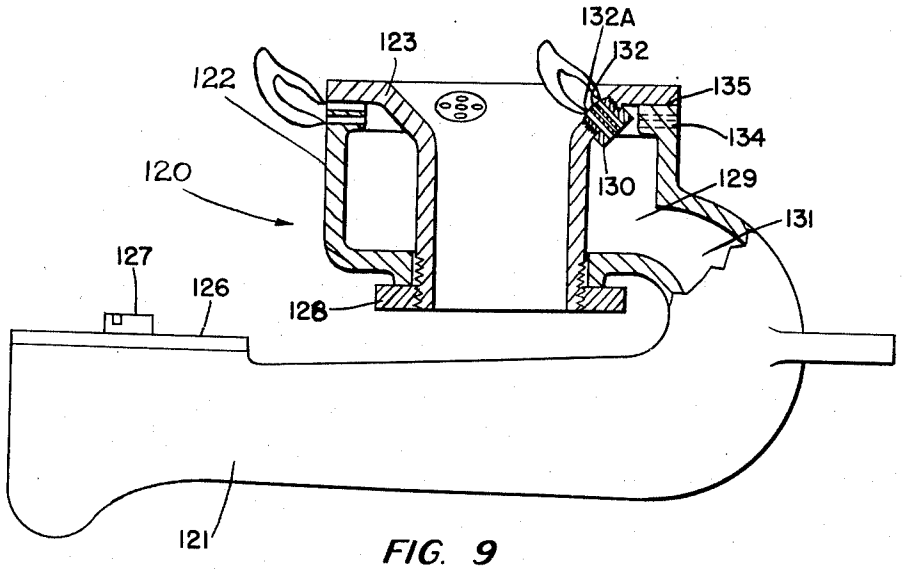


FIG. 9

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GAS BURNER HEAD HAVING RIBBED CAP MEMBER PROVIDED WITH PERIPHERALLY DRILLED PORTS

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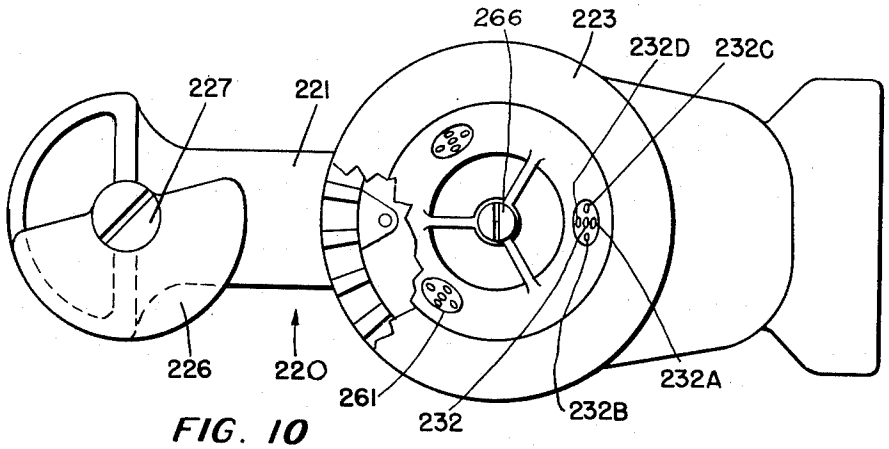


FIG. 10

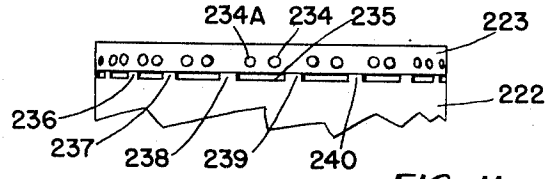


FIG. 11

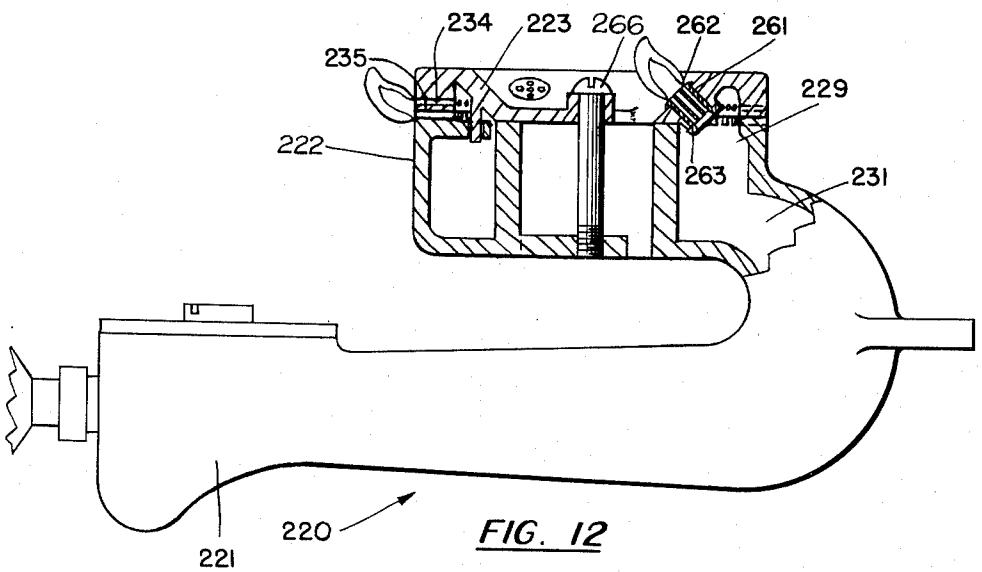


FIG. 12

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GAS BURNER HEAD HAVING RIBBED CAP MEMBER PROVIDED WITH PERIPHERALLY DRILLED PORTS

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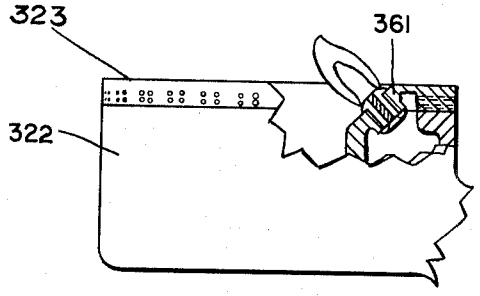


FIG. 14

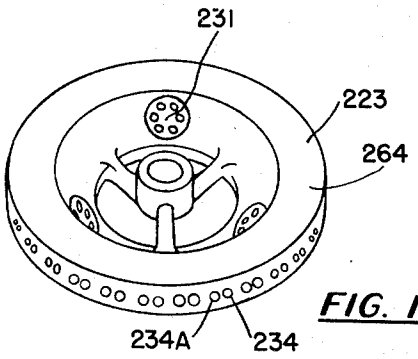


FIG. 13

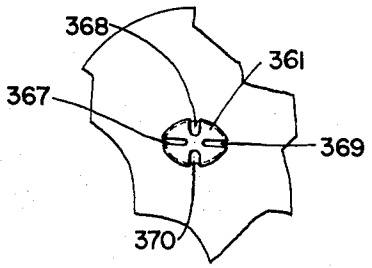


FIG. 15

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United States Patent Office 2,817,397
Patented Dec. 24, 1957

2,817,397

GAS BURNER HEAD HAVING RIBBED CAP MEMBER PROVIDED WITH PERIPHERALLY DRILLED PORTS

Isaac Vernon Brumbaugh, Clayton, Mo.

Application April 10, 1951, Serial No. 220,313

8 Claims. (Cl. 158—116)

This application is directed to subject matter similar to that shown in my Patent 2,609,871, granted September 9, 1952, on application Serial No. 745,138, filed May 1, 1947, and is directed to inventions similar to those disclosed in my co-pending application, Serial No. 215,220, filed March 13, 1951.

The inventions disclosed in this application relate to burners for gas cooking stoves and especially to burners of the type useful as top burners and commonly called cooking top burners. Heretofore, cooking top burners have usually been manufactured in three separate different designs for three different types of gas. Usually, there has been manufactured a burner with small size ports and with a small total port area which is used for manufactured gases. Second, there has also been usually manufactured a cooking top burner with medium size ports and with a medium total port area for use with petroleum gases such as butane and propane and with butane-air, propane-air, and the mixed gases, but these medium size burners have not been very good for use with propane-air and butane-air. Third, there has also been usually manufactured burners with large size ports with a large total port area for the natural gases. It is desirable to design cooking top burners which are useful with all types of gases. However, if a burner is manufactured which has a relatively small total area, it is subject to disadvantages such as a tendency to deposit soot which is often indicated by yellow tips of the flame or by a tendency for a lifting or blowing away of the flames. Therefore, a relatively large total area is necessary especially where the burner is used with natural gases and propane-air and butane-air gases. It has been shown that the total port area in such cases should be about 2½ times the throat area. If large size ports are provided in order to secure large total area, such burners have a tendency to flash back and to cause an "after pop" as the flame is turned out, especially where the burner is used with manufactured gases and propane-air and butane-air gases. Thus the reconciliation of these two opposing factors was one of the problems which I sought to solve. Each of the individual drilled ports should have a diameter less than 0.08" but greater than 0.05". Preferably each should have a diameter of about 0.07".

One of the objects of my invention, therefore, is the provision of a cooking top burner which is universal and adaptable for use with all types of gases.

A further object of my invention is the provision of such a burner which is not subject to the disadvantages of flash back and after pop on the one hand or the depositing of soot with yellow tips and the lifting or blowing of the flames from the ports on the other hand, regardless of the type of gas used.

A further object of my invention is a provision of a burner which is economical to manufacture by reason of the fact it is manufactured of a relatively small number of parts.

A further object of my invention is the provision of

a cooking top burner which has a satisfactory flame pattern consisting of a series of substantially contiguous although separate flames, as distinguished from a "ribbon flame," which latter is a continuous flame and does not aerate well and also heats the burner excessively because of the inability to convey heat away by conduction.

A further object of my invention is the provision in such a burner of a cluster of center ports which provision overcomes the disadvantage of a single or even a pair of center ports, such disadvantages being characteristic of burners which are difficult to light at any time and by flames which are most likely to go out when the gas supply is turned low, such as, for example, when the gas is turned low for simmer flame operation.

A further object of my invention is the provision of non-clogging clusters of ports around the periphery of the burner.

Further objects and features of my invention will be apparent from the following specification and claims when considered in connection with the accompanying drawings illustrating several embodiments of my invention.

In the drawings:

Fig. 1 is a fragmentary view in plan of a burner constructed according to my invention showing flames issuing from a pair of clusters of ports;

Fig. 2 is a fragmentray view in vertical section taken substantially on the line 2—2 of Fig. 1 showing flames issuing from a pair of clusters of ports;

Fig. 3 is a fragmentary view in elevation of the portion of the burner head and burner cap shown in Fig. 1;

Fig. 4 is a fragmentary bottom plan view of a portion of the burner cap shown in Figs. 1, 2 and 3;

Fig. 5 is a view corresponding substantially to Fig. 3 showing an alternative form of burner cap;

Fig. 6 is a view corresponding to Fig. 4 showing the alternative form of burner cap of Fig. 5;

Fig. 7 is a view in top plan showing an alternative form of burner differing slightly from the burners of Figs. 1–6, inclusive;

Fig. 8 is a fragmentary view in side elevation of a portion of the modification shown in Fig. 7;

Fig. 9 is a view partly in elevation and partly in vertical section of the modification shown in Figs. 7 and 8 showing, however, a flame issuing from one of the clusters of ports;

Fig. 10 is a view in top plan showing a still further modification;

Fig. 11 is a fragmentary view in elevation of a portion of the burner illustrated in Fig. 10;

Fig. 12 is a view partly in elevation and partly in vertical section showing more completely the structure shown in Figs. 10 and 11 and showing a flame issuing from one of the clusters of ports;

Fig. 13 is a view in perspective showing the separate burner cap illustrated in Figs. 10 to 12, inclusive;

Fig. 14 is a view partially in elevation and partially in section illustrating a slight modification of the construction of Fig. 12 and showing a flame issuing from one of the clusters of ports; and

Fig. 15 is a fragmentary view in plan of one of the studs shown in Fig. 14, and showing a cluster type center port construction made from an extruded rod.

Following are some of the known facts which I have heretofore proved and some of the considerations which induced my development of the burners here disclosed.

As heretofore stated, there must be at least a certain minimum of total port area in order to insure proper combustion and prevent lifting and blowing away of flames. Therefore, a good burner has sufficient total port area. A good burner will also not flash back when consuming either the manufactured gases or any of the

other gases. This means that the ports cannot be relatively large. I find that for cooking top burners, ports that are drilled should be not larger than about a No. 49 drill size (.073 inch diameter) when the wall thickness is about one quarter inch. Also, an oblong port should not be wider than about .060 inch when the wall thickness is about a quarter inch. The above dimensions are used in the construction of the burners illustrated and described herein.

With relatively large ports, gas flames will light back through the ports and burn within the burner. This is called flash back. It usually occurs only when the burner is turned fairly low, such as that approaching a simmer flame. It may occur when lighting the burner if the ports are too large in diameter or width. Small ports (small width or small diameter) are necessary to prevent such flash back or an "after pop." Lifting and blowing of the flames from the ports occurs when the burner is turned on full. The flames of slow burning gases such as the natural gases lift or blow from the ports with burners not having enough total port area. Also, with small total port area, the flames of a butane-air and propane-air will not only lift or blow away but there is also yellow (i. e. "yellow tips") in the flames which means a carbon or soot deposit therefrom. Gas burners may be said to consist of a mixing (mixer) tube and a burner head. The American Gas Association defines the "burner head" as "that portion of the burner beyond the outlet end of the mixer tube which contains the ports."

I repeat that to make good burners that burn properly with the natural gases and the butane-air and the propane-air gases (that is to say, burn without the flames lifting or blowing away from the ports when the gas is fully turned on), a relatively large number of ports or a relatively large total port area must be provided. With the narrow oblong ports which I use and with the No. 49 drill ports, there is no "after pop" when the gas is turned off. Such an "after pop" is annoying to some people and is most pronounced with the manufactured gases, butane-air and propane-air with inferior burners. Relatively small ports are necessary to prevent "after pop" or flash back.

The objectionable "yellow tips" are usually encountered with propane and butane. Yellow tips are objectionable because the flame will carry soot to be deposited on the bottom of utensils being used. When the total port area is relatively large as in the burners described and disclosed herein, enough air is injected into the burner with the gas that there is no yellow in the flames. When a burner has enough total port area to prevent lifting and blowing away of flames and the ports are made small enough so that flash back and after pop does not occur, the yellow tip problem is automatically solved. Enough port area with ports the proper dimensions and the ports properly located (i. e. spaced or grouped) and arranged are really the secrets that I have discovered which are back of designing a burner that can be used for all of the various fuel gases.

Aeration of flames is also very important because the burners have to pass combustion tests and efficiency tests of the American Gas Association Testing Laboratories. My burners are therefore also designed so as to produce a series of flames, not a continuous or so-called ribbon flame. A ribbon flame does not aerate as effectively as a series of flames. With my burners, the flames are contiguous to one another so as to accomplish instant spreading of the flames from one of the peripheral ports to the other, yet the spacing is such as to provide for the access of the secondary air between the flames. This is conducive to proper combustion of the gas and to the spacing of the burners close to the utensil for good efficiency.

I have provided clusters of center ports which are essential for good performance. Single center ports or pairs of center ports will not light consistently even when there is a utensil above the burner. Single center ports or pairs of ports will not stay lighted when the gas is turned down to a good simmer setting. When the center ports do not burn, they release gas which is unpleasant and dangerous to health, so I have grouped my center ports. I prefer at least four ports in a group and drilled on a common diameter and spaced as close together as practical. I may use four, five or six center ports in groups and also use from two, three or four groups of ports to accomplish the proper distribution over the bottom of the utensil. These center ports when drilled are made, in the embodiments shown, with a drill of about No. 49 drill size (.073 inch diameter). The diameter of such ports as well as the peripheral drilled ports should be about 0.07". It should at all events be greater than 0.05" and less than 0.08". The width of the peripheral slots should be about 0.06".

It will be noticed that my burner has a one piece burner cap. So made, it is not very costly to manufacture. I prefer, especially for the peripheral ports, the flame pattern or the cluster of ports formed by one horizontally oblong port and two drilled ports such as that shown for example in Figs. 3 and 4. When there is a thin wall of, for example, less than 0.07" and preferably having a thickness of about 0.02" between the peripherally drilled ports and the horizontally formed oblong ports (and a wall of less than 0.06" between each of the peripherally drilled ports and other drilled ports of the cluster), the gas issuing from each such cluster of ports forms a common single flame with one inner cone as shown in Figs. 1, 2, 9, 12 and 14 of the drawings. Thus, there is one inner cone for each cluster of ports. The clusters of ports should be separated from each other at least at their tips and throughout most of their length in order to insure proper aeration, but should be contiguous at their bases in order that the flames may spread readily. Thus there should be a greater space (e. g. about 0.12") between each cluster or group of ports. As stated above, however, the distance between the ports or slots of a cluster should be less than about 0.06". This minimum distance between clusters applies as well to the center top ports as to the peripheral ports.

These peripheral ports as formed in my burners are free from clogging. Boils, overdrips, etc. do not fall into the ports.

The center ports where formed as in Figs. 7–15, inclusive, could be made out of brass and the burner cap out of cast iron, which is most desired for hotel and restaurant ranges. For domestic gas ranges, I would use die cast aluminum burner caps. Either aluminum or brass rods could be used to form the center port clusters of said Figs. 7–15, inclusive, and these ports can be either made by extruded shape or drilled as is later more fully disclosed.

Referring especially for a detailed description to Figs. 1–4, inclusive, of the drawings, it may be seen that I have shown therein, a cooking top burner **20** comprising a mixing tube member or portion **21**, a burner head member or portion **22**, and an upper member or burner cap **23**. Associated with the burner **20** is a nozzle extension **24** of a burner control valve and an orifice cap **25** provided therefor. The burner **20** is provided with an air adjusting plate **26** held in adjusting position by a screw **27**. The burner cap **23** is secured to the burner head **22** by being screwed into it as at **28** and is formed in a definite and novel way for the purposes of my invention as will be later pointed out more in detail. When the burner cap **23** is secured to the burner head **22**, there is formed a closed annular space **29** which is supplied with a mixture of air and gas from the passageway **31** in the mixing tube member. This mixture of gas and air may flow upward through openings such as **32** and **32C** which are drilled in each one of a plurality of bosses **30** formed integrally on the underside of the burner cap member **23**. Such gases may also flow out horizontally through any one of a plurality of horizontally

extending peripheral openings **34** or through any one of a plurality of horizontally extending peripheral slots **35**. The inclined bores **32**, **32A**, **32B**, **32C**, **32D** and **32E** are arranged in clusters as is shown more clearly in Fig. 1 wherein it is shown that there are three clusters of six bores each, these bores being drilled concentrically about a common center and being positioned closely adjacent to each other. The bores **34** are provided in groups of two such as **34** and **34A**, the groups extending all the way around the periphery of the upper cap member **23**, as is shown more clearly in Figs. 3 and 4. Each group of two bores is positioned above a horizontally extending slot such as slot **35**. The slots are formed by the contact of ribs such as the ribs **36**, **37**, **38**, **39** and **40** which are formed on and extend down from the periphery of the burner cap **23** to contact with a circular flange on the burner head member **22**. The diameter of the bores, the width of the slots, the distances between bores and slots in each cluster and the distance between clusters in these embodiments as well as in all of the following embodiments conform to the dimensions and distances previously discussed above.

Instead of arranging the bores corresponding to the bores **34** in groups of two as shown in Figs. 3 and 4, I may arrange them in groups of three (or even more) as the bores **41**, **41A** and **41B** are shown in Figs. 5 and 6. I prefer, however, the arrangement shown in Figs. 3 and 4. Below each group of three bores as shown in Figs. 4 and 5, I provide a horizontal slot such as the slots **43**, **44**, **45** and **46** formed by the ribs **47**, **48**, **49**, **50**, and **51** formed on the cap member **23** which ribs contact with the top of the burner head member **22**.

In Figs. 7, 8 and 9, I show several slight modifications of the burner shown in Figs. 1–4, inclusive. Therein, like and similar parts are indicated by the same numerals with the addition of 100. It will be noticed that this burner differs mainly in four respects: (1) The bores **134** and **134A**, etc. are formed in and the lugs **136–140**, inclusive, are formed on, the upper surface of the burner head member **122** on which the flat surface of the burner cap **123** rests. Obviously (although preferably not in practice), some or all of the ribs and/or bores could alternatively be formed in one member and the remainder of the ribs and/or bores formed in the other. (2) The studs **130** are screwed into threaded openings formed in the burner cap **123**. (3) The burner cap **123** is secured to the burner head member **122** by a separate nut or threaded ring **128** instead of being screwed directly into screw threads formed in the burner head member **122**. (4) The studs **130** are formed with five bores **132**, **132A**, **132B**, **132C** and **132D** instead of six as shown in Fig. 1, the four bores **132A**, **132B**, **132C** and **132D**, being arranged concentrically around the center bore **132**.

In Figs. 10–13, inclusive, I show several other slight modifications of the burners shown in Figs. 1–9, inclusive. Therein like and similar parts are indicated by the same numerals as in Figs. 1–4, inclusive, with the addition of 200. It will be noticed that the burner of Figs. 10–13, inclusive, differs mainly in five respects: (1) The bores **234** and **234A**, etc. are formed in the burner cap **223**, while the ribs **236—240**, inclusive, etc. are formed on the burner head member **222**. Obviously, this construction could be reversed and bores formed in the burner head with the ribs formed on the burner cap. (2) The members **261** are formed separately. They have an overlap as at **262** and are clinched as at **263** and are formed with five bores **232**, **232A**, **232B**, **232C** and **232D**. (3) The burner cap **223** is secured to the mixing tube member in a manner as shown in Fig. 12 by a bolt **266**. (4) The burner cap **223** is constructed as is shown more clearly in Fig. 13. (5) The burner cap **223** is formed of a top plate portion **264**, and is secured to the burner head **222** by the bolt **266**.

In Figs. 13 and 14, the burner cap **323** is provided with extruded members **361** which instead of being made with bores, are provided with formed slots **367**, **368**, **369** and **370**. There is provided a burner cap **323** secured to the burner head **322** in a manner similar to that shown in Fig. 2. The members **361** are secured to the burner cap in the same way as in Figs. 10–12, inclusive. No ribs are provided but each cluster of ports consists of two ports above two ports, all drilled in the burner cap **323**.

Burners constructed according to my invention are designed for use for all kinds of fuel gases without any variation in the size of the ports. This means that they are made one way only for all kinds of gases which includes manufactured gases, natural gases, bottle gases (liquified petroleum gases) such as propane and butane, the propane-air and the butane-air gases, and mixtures of these gases of all heating values. Also, the various reformed gases, including manufactured gases to which propane and butane have been added may be used. A burner that will operate properly with all of the gases mentioned above may be known as a universal burner. My burner caps are also very economical to manufacture because of the small number of pieces by which they are formed. My burner caps are made in the preferred embodiments with a series of two peripheral ports drilled above horizontal slots and are made from a one-piece casting which is secured to the burner head portion of the burner.

Considerable emphasis has been placed above on the dimensions of various ports and the distances between ports. Certain of these dimensions are critical. All of them are important in order to produce an optimum universal burner but some of them are not absolutely critical. In Fig. 3, I have indicated dimensions *a*, *b*, *c*, *d*, *e*, and *f*. Dimension (*a*) is important, but not critical. It is necessary to have a wall between the drilled port and the horizontal slot. In production there is often some variation in jigs, etc. The distance should preferably be about 0.02". It should not be more than about 0.07".

Dimension (*b*) which is the diameter of the drilled ports is very important. It should preferably be about 0.073". If the diameter of the drilled port is increased to 0.08" or larger, an "after pop" or flash back is likely with some gases. If on the other hand this port is drilled with a diameter of 0.05" the total port area obtained is less than is desirable for slow burning gases. Thus, to secure an optimum universal burner, it is critical that the diameter of such ports be greater than 0.05" and less than 0.08".

Dimension (*c*) is the space between separate clusters of peripheral ports. This space dimension is essential in order to keep the flames and cones from merging. It should not be less than about 0.08". It preferably is about 0.12". It can be any dimension larger than 0.08" except that if this distance and the width of the ribs **36**, **37**, etc. is made much greater than about 0.12", the flames will not spread readily in lighting the burners.

Dimension (*d*) is the width of the ribs **36**, **37**, etc. A rib of about 0.09" is preferable. The limits of width about 0.08" (narrowest) and 0.12" (widest). It may be noted that the distance between the outer ports of the drilled ports **34**, **34A**, etc. of one cluster and the outer ports of the adjacent cluster may be slightly greater than the width of the ribs inasmuch as the flames may spread between the slots **36**, **37**, etc. and thus to the drilled ports. Also, the contrary may be true. If the drilled ports are close enough together to insure spreading the ribs may be wider inasmuch as the flames could then spread from the drilled ports of each cluster to the drilled ports of adjacent clusters and from the drilled ports of each cluster to the slots thereof. The limits of the width of the ribs are to provide for separation of flames while allowing spreading thereof and to provide means for conducting the heat of the burner cap to the burner head.

Dimension (*e*) can be about 0.06". It, of course, cannot be too large inasmuch as the flames might then be separate. Also there should be at least some wall between the ports. Manufacturing and strength considera-

tions are considered in determining this distance. This dimension can be much less than 0.06" provided there is at least a thin wall between the ports. A very thin wall between the ports is enough especially if the ports are drilled parallel to each other.

Dimension (*f*) is the slot width. This dimension is also critical. It should be about 0.06". If much larger there is likely to be an "after pop" or flash back with some gases. Even a width of 0.065" is most likely to cause objectionable performance with the critical gases. If sufficient port area may be obtained with a width less than 0.06" a lesser width may be used.

To sum up, to produce an optimum universal burner, I require a series of slots about 0.06" wide augmented by a series of drilled ports of about 0.073" in diameter of sufficient size and quantity to obtain sufficient total port area. These two dimensions (*b*) and (*f*) are the two really critical dimensions. My arrangement of slots augmented by drilled ports of approximately the sizes set out in this paragraph are very effective in designing an optimum universal burner.

In the operation of the burners disclosed gas is introduced into the mixing tubes and there mixed with primary air which flows into an annular space (space 29, etc.) and thence issues through the clusters of peripheral ports (clusters of ports 34, 34A, 35, etc.) and the clusters of center ports (clusters of ports 32, 32A, 32B, 32C, 32D, 32E, etc.) where because of the small dimensions of the ports there is no tendency for flash back or after pop. Because of the small distances between ports of each cluster, it forms a single flame as shown in Figs. 1 and 2. Because the clusters are spaced a sufficient distance, no ribbon flame is formed but instead a series of flames are formed as indicated in Fig. 1. Because of the relatively large number of relatively small ports, sufficient port area is provided to fulfill the requirements of the port area needed to prevent yellow flames and carbon deposit. Because of the unique construction, the necessary total port area with the necessarily relatively small ports is provided in a construction which is efficient, inexpensive to manufacture and wholly satisfactory.

It is to be understood that the above described embodiments of my invention are for the purpose of illustration only and various changes may be made therein without departing from the spirit and scope of my invention.

I claim:

1. For use in combination with an inlet section of a substantially circular burner head having a flange to form a cooking top burner, a substantially circular burner cap formed with a plurality of ribs extending downwardly so as to contact with the peripheral surface of the flange on the inlet section to form peripheral slots, said cap being also formed with a plurality of peripheral drilled ports which are positioned adjacent to but spaced from each of said slots and are arranged in clusters, each of such clusters being positioned closely adjacent to one of said slots but separated a much greater distance from all other clusters and from all other slots.

2. A gas burner comprising a substantially circular inlet section and a substantially circular outlet section, one of said sections being formed with an annular flange having a substantially smooth surface and the other section being formed with an annular flange corresponding in size to and contacting with the flange of the first named section and formed with a series of ribs which bear upon the smooth surface of the first named flange so as to form a series of peripheral openings between the ribs and being made with a plurality of peripheral drilled ports which are positioned adjacent to each of said openings and are arranged in clusters of ports, each of such clusters of ports being positioned closely adjacent to one of said openings but separated a much greater distance from all other clusters and from all other openings.

3. A cooking top burner having a plurality of oblong slots each spaced from each other a distance of about 0.10", each having a width less than about 0.06" and having adjacent to and arranged in a line parallel to and substantially coextensive with each of said slots a group of drilled ports each having a diameter of about 0.07", each port being positioned at a distance less than about 0.07" from said adjacent slot and at a distance of not more than 0.06" from another of the ports of said group so that the group of ports form a cluster from which gas issues in a stream to form a single flame with a single inner cone.

4. A cooking top burner having a plurality of oblong slots having a width less than about 0.06" and having adjacent to and arranged in a line parallel to and substantially coextensive with each of said slots a group of a plurality of drilled ports each having a diameter of about 0.07", each port being positioned at a distance of less than about 0.07" from said adjacent slot and at a distance of not more than about 0.06" from another of the ports of said group so that the slot and the group of ports form a cluster from which gas issues in a stream to form a single flame with a single inner cone.

5. A cooking top burner having a plurality of substantially separated oblong slots having a width less than about 0.060" and having adjacent to and arranged in a line parallel to each of said slots a group of a plurality of drilled ports each having a diameter of about 0.07" each said group being positioned parallel to and closely adjacent to one of said slots and separated a much greater distance from all other groups and from all other slots.

6. A cooking top burner consisting of a burner head member formed with a substantially circular vertical opening at its upper end, said circular opening being surrounded by a circular rim; and a burner cap member having a circular rim corresponding substantially in size to said circular opening and positioned at the upper end of said burner head member and having extending laterally through said rim, a plurality of clusters of circumferentially peripheral openings, the centers of the openings of each of said clusters of circumferential openings substantially forming a circle, each of the openings of each cluster being positioned a distance of not greater than about 0.06 inches from some other opening of the same cluster, the distance of each opening of each cluster being not less than about 0.08 inches from the nearest opening of each different cluster, and the openings of each cluster being so arranged relative to each other that the geometric center of the circle is imperforate; the burner cap member being held in a central position relative to the burner head member and having its circular rim in contact with the rim of the circular opening.

7. A burner comprising a member consisting of a burner head, a member consisting of a burner cap contacting and held in a central position relative to said burner head, said members having openings between them which form a series of ports extending outwardly from between the two said members, at least one of said members having also a plurality of peripheral drilled ports which are positioned adjacent to said openings and are arranged in clusters, each of such clusters being positioned closely adjacent to one of said openings but separated a much greater distance from all other clusters and from all other openings, and means for supplying gas to said openings and to said peripherally drilled ports whereby said peripherally drilled ports augment the supply of gas from said openings to produce a universal gas burner.

8. A burner comprising a substantially circular burner head member formed with a substantially circular edge and a substantially circular burner cap member also formed with a substantially circular edge which contacts with the circular edge of the burner head member, the burner head member and the cap member being in contact and held in a substantially coaxial position relative to each other and one of said members being formed adjacent to its said substantially circular edge with a series

of ribs contacting the circular edge of the other member and forming therewith a series of peripheral slots and one of said members being formed with a plurality of peripheral holes which are positioned adjacent to each of said slots and are arranged in clusters of holes, each such cluster of holes being positioned closely adjacent to one of said slots but separated a much greater distance from all other clusters and from all other slots.

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