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GAS BURNER

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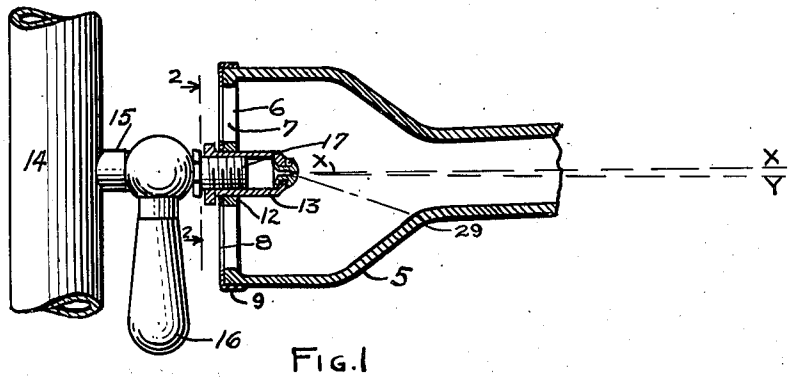


FIG. 1

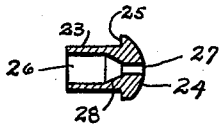


FIG 4

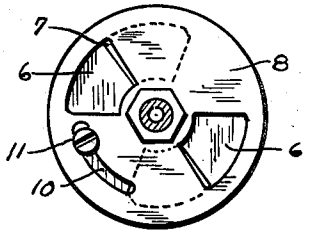


FIG. 2

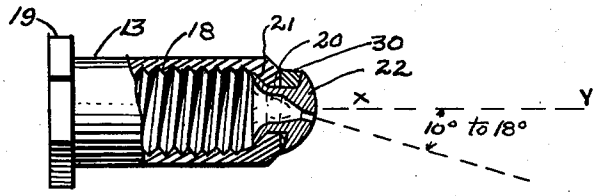


FIG. 3

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GAS BURNER

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Application February 24, 1940, Serial No. 320,560

1 Claim. (Cl. 158—118)

This invention relates to improvements in gas burners of the type described and claimed in United States Patent No. 1,867,526, granted July 12, 1932, and in United States Patent No. 2,187,010, granted January 16, 1940.

In the burning of gas for fuel purposes, it is necessary to mix the gas with a certain amount of primary air before the gas emerges from the burner where it is ignited and burns in contact with a supply of secondary air.

For the purpose of providing the proper mixture of air and gas, various specifically different types of burner assemblies have been employed, but for the purpose of describing the present invention, the conventional burner assembly in general use on kitchen ranges will be employed. Such burner assemblies comprise a burner head in the form of a hollow casting perforated with burner ports. A combustible mixture of gas and air enters the burner head through a mixing chamber. The gas enters the mixing chamber through a gas orifice and the shape of the chamber and direction of the entering gas are correlated to produce an injection effect so that air is drawn into the chamber through suitable air ports and flows through the gas burner to the burner head. The amount of primary air required for the satisfactory burning of different types of gas varies considerably and therefore a burner assembly designed and successfully used for one type of gas may be unsuited for effecting a satisfactory mixture of gas and primary air for the efficient burning of some other type of gas.

In the conventional gas burner of the type employed with kitchen stoves, it is the practice to regulate the flow of primary air into the mixing chamber by means of shutters which rotate about the orifice cap and by means of which the effective size of the air inlet ports can be varied. The shutters employed in the conventional burner have in some instances been found unsatisfactory where a wide variation in the openings is required and especially when the parts are so adjusted as to produce a considerable vacuum which requires the shutters to be adjusted to very small openings for the entry of the primary air. Such small openings are first of all difficult to properly adjust and they also very easily become clogged with grease, dust and other foreign matters forming lint to such an extent that the openings must be cleaned from time to time.

In order to reduce the suction which results from the injector action of the gas, it has been the practice to produce turbulence in the air mixing chamber by inserting a screw or other obstruction in the path of the gas jet. By this means the suction is diminished and the air inlet ports can then be maintained at a proportionately larger area.

In United States Patent No. 1,867,526, an orifice cap has been shown and described which directs the gas in an axial stream and which when used in connection with an ordinary kitchen gas burner produces a maximum injector action.

In United States Patent No. 2,187,010 an orifice cap has been shown in which means is provided for changing the direction of the gas stream with respect to the gas burner so that the injector action can be varied in such a way as to produce the optimum suction to be employed with the particular kind of air inlet ports used.

It is the object of the present invention to produce a simple orifice cap which is a modification of the one shown and described in Patent No. 1,867,526 and by means of which the angle at which the gas enters can be predetermined and definitely fixed when the orifice cap is made.

The above and other objects that may become apparent as this description proceeds are attained by means of a construction and an arrangement of parts that will now be described in detail and for this purpose reference will be had to the accompanying drawing in which the invention has been illustrated and in which:

Figure 1 is a horizontal sectional view through a mixing chamber of a gas burner employing the present invention;

Figure 2 is a view taken on line 2—2, Figure 1, showing a front elevation of the mixing chamber and the construction of the conventional shutter employed for regulating the entrance of primary air;

Figure 3 is a view partly in section and partly in elevation showing the improver orifice cap that forms the subject of this invention; and

Figure 4 is a diametrical section through an adapter.

In the drawing reference numeral 5 designates a conventional mixing chamber such as is usually employed with the ordinary kitchen gas range. The mixing chamber is shown broken away at the right where it connects with the ordinary gas burner. The enlarged end of the mixing chamber is closed by a wall 6 that is provided with openings 7 of which two are shown in the present embodiment. A rotatable shutter 8 is

provided with a cylindrical flange 9 and is positioned on the outer surface of the end wall 6. The shutter is provided with an arcuate slot 10 for the reception of a clamping screw 11 by means of which the shutter can be secured in adjusted position. The wall 6 and the shutter 8 are provided with concentric openings 12 through which the orifice cap 13 extends. Referrence numeral 14 designates a gas pipe that is connected with a suitable source of gas under pressure and this pipe is perforated for the reception of a valve 15 that can be opened and closed by a rotation of the handle 16. This valve has a threaded connection 17 to which the orifice cap 13 is secured. In the drawing broken line X—X designates the common axis of the mixing chamber and the Venturi portion of a gas burner; this axis has been shown as slightly displaced from the line X—Y which is the axis of the orifice cap 13. Due to the fact that such burners are never positioned with any great precision, it is very seldom that the axis of the burner and the axis of the orifice cap are coincident but are nearly always angularly displaced to some extent.

Referring now more particularly to Figure 3, reference numeral 13 shows the orifice cap whose interior is provided with threads 18 which engage the threads on the connector 17. The open end of the orifice cap has a hexagonal flange 19 for engagement by a suitable wrench. The orifice end of the cap has an opening 20 which is connected by an inclined wall 21 with the threaded surface. The opening 20 in the orifice cap is closed by means of an adapter 22 constructed in the manner shown in Figure 4. The adapter consists of a cylindrical section 23, one end of which has a spherical or semispherical head 24 of somewhat larger diameter. A shoulder 25 is formed at the inner end of the head where it connects with the cylindrical portion. The diameter of the cylindrical portion is the same as that of opening 20 so that the adapter will fit the opening with a snug fit. The adapter is provided with an axial opening comprising a cylindrical portion 26 of comparatively large diameter, which is connected with the gas orifice 27 by a frustoconical wall 28. It will be observed that the adapter is so constructed that the axis *a—b* of the orifice 27 coincides with the axis of the cylindrical portion 26. When such an adapter is inserted into the opening 20 in the way described in Patent Number 1,867,526 above identified, axis *a—b* will coincide with axis *x—y*.

It has been found that if the axis *a—b* of the orifice 27 is displaced at an angle of between ten and eighteen degrees from axis *x—x* of the mixing chamber and venturi, the stream of gas which emerges from the orifice will strike the inner surface of the Venturi tube portion of the mixing chamber at a point indicated by reference numeral 29, so as to produce a turbulence and thereby reduce the suction due to the injector action which is produced by the gas jet. It has been found desirable to fix the angle of the gas jet at such an amount that the deflection or turbulizing action will produce results of merit. The angle must, therefore, not be made so large that the gas will be directed rearwardly or "back up" which is likely to occur when the flame is turned low thereby reducing the pressure and the air entrainment.

In order to displace the axial relation of the orifice cap without resorting to difficult and expensive mechanical operations, a wedge-shaped washer 30 is provided. The angle between the sides of this washer is the same as the angular displacement desired between the axis of the orifice cap and the orifice 27 which, in this case, will be considered as between ten and eighteen degrees. Before the adapter is inserted into opening 20, a wedge shaped washer is placed on the cylindrical part 23 and the three parts are then subjected to pressure so as to force the shoulder 25 of the adapter against the inclined outer surface of the washer and thereby angularly displace the axis of the orifice 27. The adapter is secured in place by expanding the inner end of the cylindrical portion so as to force it against the inclined sides 21, thereby producing a unitary assembly that will positively maintain the desired angular relation between the axes of the orifice and of the orifice cap. The adapter is secured in place by means of special tools described in Patent No. 1,867,526 which will therefore not be illustrated and described in the present application.

Let us now assume that an orifice cap constructed as shown in Figure 3 is applied to the threaded projection 17 and that the burner is positioned as shown in Figure 1. When the gas is admitted the jet issuing will follow the line *a—b* extending from the orifice 27 to point 29 on the inner surface of the Venturi portion of the burner, which turbulence will be produced and it will then flow to the burner mixed with the proper amount of primary air, the shutter being adjusted to obtain the desired proportion of primary air. If the axis X—X of the mixing chamber and Venturi portion of the burner coincides with the axis X—Y of the orifice cap, any rotation of the orifice cap will merely rotate the point of incidence of the gas around the interior of the mixing chamber. If, however, the axis of the mixing chamber is displaced with respect to the axis of the orifice cap, which is always the case, except in rare instances, or if the opening is noncircular, a rotation of the orifice cap will vary the angular relation between the gas stream and the inner surface of the Venturi portion of the burner so as to obtain a variation in the injector action. It is apparent from the above that although this orifice cap is constructed with a fixed angular relation between its axis and the axis of the orifice 27, a variation in effect can be produced by rotating the cap on the threaded connection 17.

It has also been found that even where the two axes X—X and X—Y coincide, a difference in effect is produced by rotating the orifice cap due to various other causes, such as the relationship between the air inlet ports and the position where the gas jet strikes the inner surface of the burner, or a noncircular shape of mixing chamber casting, or due to burrs or rough spots which are nearly always found in cast burner tubes.

From the above description it will be seen that an orifice cap having a gas orifice inclined with respect to its axis can be produced by the assembly of the orifice cap, the adapter shown in Figure 4 and the washer 30 without necessitating the use of complicated machines or resorting to difficult mechanical operations. Such an orifice cap always remains adjusted to a fixed angle and can be quickly installed. Where an old appliance is to be converted, the orifice caps or plugs in place thereon can be used in making the modifications which reduces the cost of the conversion.

Having described the invention what is claimed as new is:

A three part orifice cap comprising the combi-

nation with a tubular orifice cap having a threaded opening extending inwardly from one end, the other end being provided with an opening of smaller diameter, concentric with the threaded opening and in axial alignment therewith, of an adapter located in the smaller opening, said adapter having a hollow cylindrical portion whose outer surface is smooth and whose diameter is such that it will enter the said opening in the end wall of the cap with a snug fit, the outer end of the adapter having a head of larger diameter than the cylindrical portion, an annular radial wall at the inner end of the head forming a shoulder, a wedge shaped washer positioned on the cylindrical portion between the head and the end of the cap, the cylindrical portion of the adapter having a bend at the outer end of the cap whereby one side of the washer will fit against the end of the cap and the shoulder of the adapter will fit against the other side of the washer, the end of the adapter within the orifice cap being expanded and flanged outwardly to secure the adapter in place.

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