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P. E. BECKMAN ET AL

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GAS BURNER

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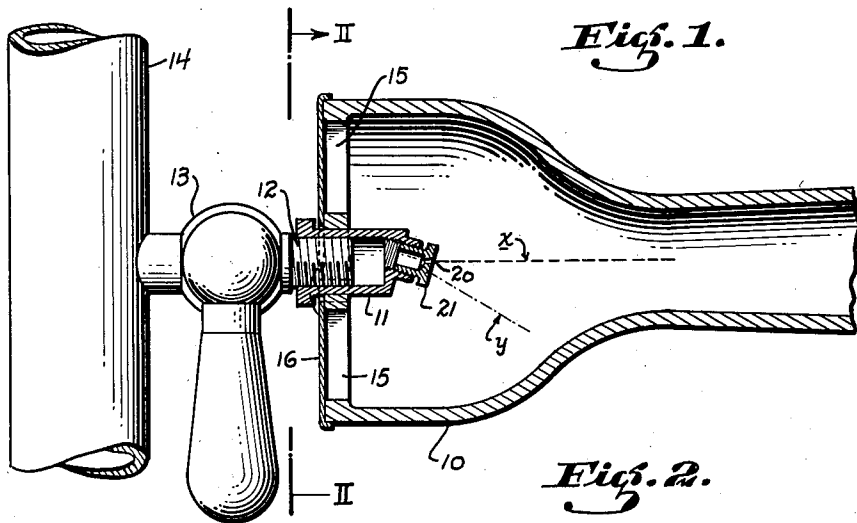


Fig. 2.

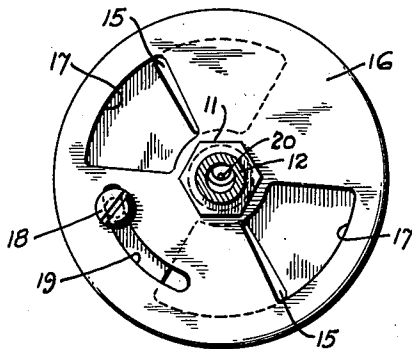


Fig. 3.

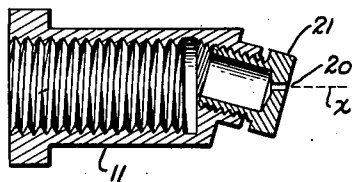
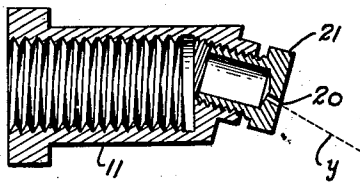


Fig. 4.



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GAS BURNER

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6 Claims. (Cl. 158-118)

This invention relates to gas burners, and particularly to the means for adjusting the mixture of gas and air in gas burners.

The invention is concerned generally with the admixture of so-called primary air with any fluid fuel, but may best be illustrated and described by reference to its embodiment in a specific form. For purposes of illustration reference will therefore be made to the type of burner assembly in general use on kitchen ranges which utilize gas for fuel. It will be apparent as the description proceeds, however, that the invention is in no sense limited to the particular use in connection with which it is to be described.

The conventional gas burner assembly comprises 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 injecting effect so that air is drawn into the chamber through suitable air ports and flows with the gas to the burner head. The relationship between the amount of this primary air required for the satisfactory burning of different types of gases varies considerably and to the extent that in many instances a burner assembly designed and successfully used for one type of gas may be incapable of effecting a satisfactory admixture of gas and primary air for the efficient burning of some other type of gas.

It is conventional practice to regulate the flow of primary air into the mixing chamber by means of shutters which regulate the effective size of the air ports in these mixing chambers. These shutters have been found impractical to provide the required range of adjustment of primary air flow. Among the disadvantages encountered in the use of such shutters is the fact that when they are adjusted to produce small openings for the entry of primary air into the mixing chamber, the openings are very likely to become clogged with grease, dust and other foreign matter to the extent that the mixture of gas and air changes, and efficient operation of the burner is interrupted.

It is the object of the present invention to provide means for regulating the flow of primary air in a burner, which means is readily adjustable throughout a wide range, capable of attachment to the existing types of burners, inexpensive and simple in construction and operation, and which will overcome the disadvantages of air-regulating shutters in use at the present time.

One form of the present invention is exemplified in the accompanying drawing, and detailed reference to the drawing is made in the following

specification wherein further objects and advantages of the invention are made apparent.

In the drawing—

Fig. 1 is a horizontal sectional view through a mixing chamber of a gas burner embodying the present invention;

Fig. 2 is a view taken on line II—II of Fig. 1 showing a front elevation of the mixing chamber and the construction of a conventional shutter employed for regulating air flow there-through;

Fig. 3 is an enlarged central longitudinal section of the gas orifice cap illustrated in Fig. 1; and

Fig. 4 is a similar view of the same cap illustrating the parts in a different position of adjustment.

In Fig. 1 of the drawing, a conventional mixing chamber is illustrated at 10. The mixing chamber is shown as broken away at the right-hand side of the figure where it would lead to a burner head of a suitable type not shown. A gas orifice cap generally indicated at 11 is shown as entering the mixing chamber and as supported by means of a threaded connection 12 with the end of a gas cock 13 which communicates with a manifold pipe 14 in turn communicating with a source of supply of fuel gas.

Conventionally, the end of the cap 11 is provided with a gas orifice which, upon opening of the cock 13, directs a stream of gas axially through the mixing chamber and effects an injecting action to draw air through ports 15 in the end of the mixing chamber, which air mixes with the gas, this mixture passing through to the burner plate. A shutter 16, shown in Figs. 1 and 2, overlies the end of the mixing chamber and has ports 17 corresponding in shape with the ports 15, and adapted upon rotation of the shutter to vary the size of the openings through which air may enter the mixing chamber. A screw such as indicated at 18 is usually provided to extend through a slot 19 in the shutter to lock the shutter in its adjusted position.

When the shutter is moved to a position like that illustrated in Fig. 2 with the air openings 15 reduced to comparatively narrow slits, a good deal of trouble is occasioned by these openings becoming clogged, which results in variation in the primary air flow. Consequently, a burner originally set for perfect operation becomes inefficient and burns poorly, due to the improper proportion of gas and air.

According to the present invention, the burner cap 11, as most clearly shown in Figs. 3 and 4, has a gas orifice 20 formed in a plug 21, and this plug is rotatably mounted at an angle in the end of the orifice cap. The orifice cap is bored for the reception of the plug at an angle of about fifteen degrees (15°) to its longitudinal axis, although this angle is not critical, and the plug

21 may be seated therein by a threaded connection, as illustrated, or it may be frictionally retained therein or secured therein in any manner which will permit of its rotation. It is desirable that the fit between the plug 21 and the boring in the end of the orifice cap which receives it be sufficiently tight so that the plug may be rotated for adjustment without becoming loose.

10 The gas orifice 20 provided in the plug 21 is drilled at an angle to the longitudinal axis of the plug 21, and this angle is preferably the same as the angle at which the plug is disposed with relation to the orifice cap 11. It is also desirable that the orifice 20 be so positioned in the end of the plug 21 that it may, upon rotation of the plug, be brought into alignment with the axis of the orifice cap 11, as illustrated in Fig. 3. In this position, the jet of gas projected through the orifice 20, upon opening of the gas cock, will be directed axially through the venturi-shaped mixing chamber, and the result will be that a maximum of primary air will be drawn into the chamber through the ports 15, assuming the shutter 16 to be wide open or entirely removed. The direction of the gas flow in this position is illustrated by dotted line *x* in Fig. 1. Upon rotation of the plug 21, the direction of the orifice 20 may be varied, due to the angularity of the orifice in the plug 21, and due to the angular position of the plug in the orifice cap 11, to the position illustrated in Fig. 4, where the angle of the gas stream projected thereby will be that illustrated by the dotted line *y* in Fig. 1. The plug 21 may be provided with a hexagon shape at its outer end to facilitate this adjustment by a wrench, or it could be provided with a screwdriver slot in its end, or any other suitable means of effecting rotation for this adjustment either by hand or with a suitable tool.

40 As has been stated, a gas jet projected through the mixing chamber in the direction of the dotted line *x* will effect a maximum flow of primary air into the mixing chamber. To the contrary, projection of this jet in the direction indicated by dotted line *y* will cause it to strike against the inner wall of the mixing chamber and will result in a turbulence that will reduce the efficiency of injection within the mixing chamber, and consequently will reduce the amount of air drawn into the chamber through the ports 15. The dotted lines *x* and *y* indicate the extremes of adjustment, but the direction of the stream of gas flowing through the orifice 20 may be varied to any position between these extremes, and consequently the flow of air through the ports 15 may be accurately controlled without the necessity of any shutter means on said ports. Thus the shutter 16 may be left wide open or completely removed so that there is no chance of the air openings becoming clogged or congested with foreign matter.

It has been found that a wider range and a more satisfactory adjustment can be effected by the means disclosed herein than is possible with the use of the conventional shutter. A further advantage of the adjusting means of the present invention over other structures that have been employed for the adjustment of primary air in gas burners is that it does not produce a whistling or hissing sound, but is capable of operation in any desired position with comparative silence.

The adjusting means of the present invention

has been found particularly valuable in connection with the necessity of converting gas burners for use with one type of gas to use with another type, such, for example, as is encountered where natural gases are being substituted for manufactured gases. In such cases, an orifice cap 11 may be substituted for the conventional cap that has been used on the burner. Where it is necessary, as it is in many cases, to provide a smaller size of gas orifice, the plug 21 may be easily removed and replaced with a plug having an orifice 20 of a size to meet the requirements of any particular burner.

Having thus described our invention, what we claim and desire to secure by Letters Patent is—

1. In a gas burner assembly having a gas orifice cap for projecting a stream of gas through a venturi-shaped mixing chamber whereby a flow of air will be induced in said chamber, a plug rotatably fitted in said cap at an angle to the longitudinal axis thereof, said plug having an orifice extending therethrough at angle to its axis of rotation whereby rotation of the plug will vary the direction of the stream of gas.

2. In a gas burner assembly, the combination of a chamber for mixing gas and air, an orifice cap for directing a stream of gas through said chamber to induce a flow of air into the chamber, and a plug in said orifice cap rotatable about an axis disposed at an angle to the axis of the orifice cap and mixing chamber, said plug having an orifice extending through it at an angle to its axis of rotation, whereby rotation of the plug will effect variation of the angle of the orifice with respect to the longitudinal axis of the burner cap and mixing chamber.

3. An orifice cap for a gas burner comprising a cylindrical shell having an angularly disposed opening at one end, and a plug rotatably adjustable in said opening, said plug having an angularly disposed orifice therein.

4. An orifice cap for a gas burner comprising a cylindrical shell having an angularly disposed opening at one end, and a plug rotatably adjustable in said opening, said plug having an angularly disposed orifice therein, the angle of said opening and the angle of said orifice being such that the orifice may be aligned with the longitudinal axis of the orifice cap by rotation of the plug.

5. In a burner assembly of the character described, comprising a chamber for mixing gas and air, a nozzle for directing a stream of gas through said chamber to induce a flow of air to the chamber and having an opening disposed at an angle to the direction of flow through said chamber, and a rotatable member closing said opening and having an orifice extending through it at an angle to its axis of rotation whereby rotation of said member will vary the angle of the orifice with respect to the direction of flow through the chamber.

6. In a device for mixing fluids comprising a mixing chamber and an injection nozzle, an orifice tip on said nozzle comprising one part having an opening disposed at an angle to the direction of flow through said chamber, and a rotatable closure for said opening having an orifice therein disposed at an angle to its axis of rotation.

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