Sept. 25, 1951 A. J. TURPIN 2,569,356

GAS FLAME RETENTION ELBOW BURNER NOZZLE

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Fig. 1.

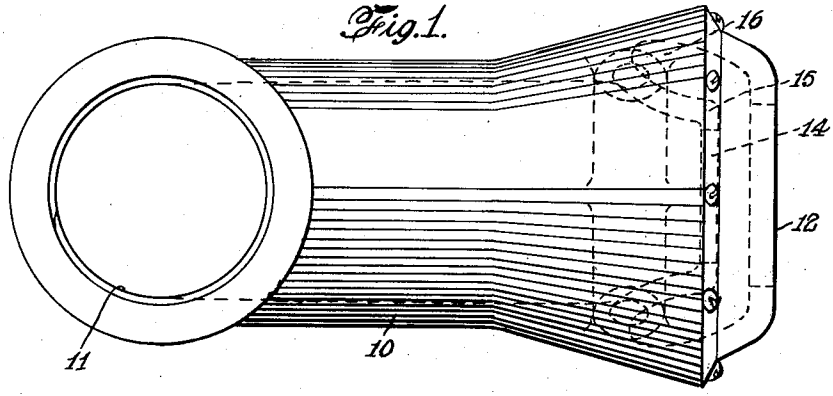


Fig. 3.

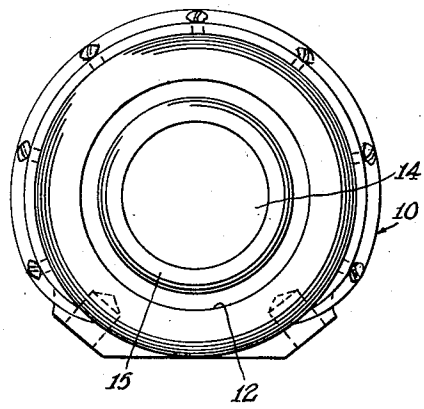


Fig. 2

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GAS FLAME RETENTION ELBOW BURNER NOZZLE

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1 Claim. (Cl. 158—116)

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The invention relates to burners utilizing a combustible gaseous fuel mixture such as is produced from a solid or from a liquid combustible. In the use of burners with a gaseous medium as aforesaid, the flame derived therefrom is introduced into a furnace or the like generally through a connection involving the customary 90° elbow fitting along with other fittings to a supply main, the discharge end of the elbow connecting with the burner nozzle through further fittings. These fittings and especially the 90° elbow, however, introduce an appreciable drop in the pressure supply of gaseous media and produce turbulence, so much so in fact, that not only is the efficiency of operation appreciably reduced but, particularly when operating with low-head fuel supplies, it may become impossible for the burner to function at all.

It has not been possible heretofore to employ the elbow in the nozzle since the high velocity of flow of the gaseous medium in becoming deflected causes a greater concentration of the flowing medium at the outer side or wall of greater radius of the elbow, resulting in erratic combustion and impaired efficiency.

The present invention has for an object to consolidate a burner nozzle and elbow into a single unit which is so constructed that the objectionable concentration of the flowing medium is substantially obviated and the novel member caused to operate to discharge through a single relatively large opening and at uniform and high efficiency throughout its range.

In carrying out the invention, the novel burner is constructed of an elbow member of relatively long sweep and affording the desired flow diversion angle, generally 90°, one end of the member being threaded for connection to a supply main or the like, as is well understood. The opposite and discharge end terminates in a nozzle of novel formation. Thus, as the elbow approaches its discharge end, where pressure irregularities occur, its wall is divided to form an inwardly-directed, eccentrically-disposed duct to isolate the flow to the active space and from the usual reduced pressure zone formed along the inner or shorter-radius wall of the elbow. This duct terminates in an orifice coaxial with the final discharge opening of the burner member but is displaced inwardly of the latter, being located wholly within the elbow. The other portion of the elbow divided wall at the discharge end provides with the said eccentric duct wall an annular surrounding pocket for the duct which is designed to receive a portion of the gaseous medium

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to maintain combustion in case the velocity of discharge through the discharge opening exceeds the rate of flame propagation, said pocket communicating directly with the outgoing stream of gaseous medium and with the final discharge opening.

The nature of the invention, however, will best be understood when described in connection with the accompanying drawings, in which:

Fig. 1 is a plan view of the novel elbow nozzle.

Fig. 2 is a longitudinal section thereof.

Fig. 3 is an end view of the discharge end of the elbow nozzle.

Referring to the drawings, 10 designates a 90° elbow fitting threaded at one end, as is indicated at 11, to afford connection of the fitting in manner well understood to a supply main (not shown) of a suitable combustible gaseous medium which, in the present instance, is designed to be discharged directly for use from the opposite end of the said elbow fitting through a discharge or opening 12 thereat. The said fitting to this end is modified to locate said opening 12 eccentrically of the longitudinal axis (arcuate) 13 of the elbow fitting since it has been found that the gaseous medium flowing through an elbow fitting at a relatively high velocity will, due to the curvature of the fitting, pack or concentrate under centrifugal force more or less toward the outer or greater radius wall portion of the elbow. The displacement of the discharge opening axis as well as that of a discharge orifice 14 is, therefore, toward this wall portion, the degree of displacement depending upon the relative areas of the elbow and the discharging orifice.

The outgoing flow is confined, to prevent eddies and back flows into the reduced pressure zone adjacent the wall of lesser radius, by enlarging the outermost discharge end of the elbow fitting and dividing it longitudinally to afford the orifice 14. This orifice is located behind the opening 12 and is of a somewhat reduced diameter conforming substantially to the extent of concentration of the stream of gaseous medium in flowing through the elbow fitting. The normal internal cross-sectional area of the passageway through the elbow is, to this end, constricted to from one-half to one-third, and the resulting orifice is displaced laterally toward the wall portion of greater radius such that its circumference oscillates the inner surface of said wall of greater radius.

In addition, the separation wall 15 of the discharge end portion is caused to afford an annular pocket 16 about the orifice 14 designed to receive

a small proportion of the gaseous medium through openings 17 in the separation wall, and is in direct communication with the outgoing stream of the medium and with the opening 12.

By this expedient, a sufficient supply of combustible gaseous medium is maintained in the pocket to insure the flame discharge from the burner when in operation, even should the velocity of the gaseous stream at times exceed the normal velocity of flame propagation.

I claim:

A burner member for combustible gas media, comprising a tubular elbow of substantially 90° curvature and of relatively long sweep and an entrance end adapted for connection to a source of combustible medium, the elbow terminating in flanged means at its opposite end inwardly directed to afford a single discharge opening of cross-sectional area at least equal to the bore of the elbow and located eccentrically with respect to the axis of curvature thereof, the eccentric displacement of the discharge opening being substantial and toward the elbow wall of greater radius of curvature to locate the outer portion of its circumference in proximity to said wall; and

an annular internal wall extending inwardly from the elbow wall and the flanged means near said opposite end to form a second discharge opening of smaller cross-sectional area than that of the said discharge opening, inwardly displaced with respect thereto and coaxial therewith, said annular wall having ports therein adjacent its junction with said elbow wall, said annular wall forming also between the flanged means and the annular wall in advance of the two discharge openings an annular pocket communicating with the first-named discharge opening.

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