

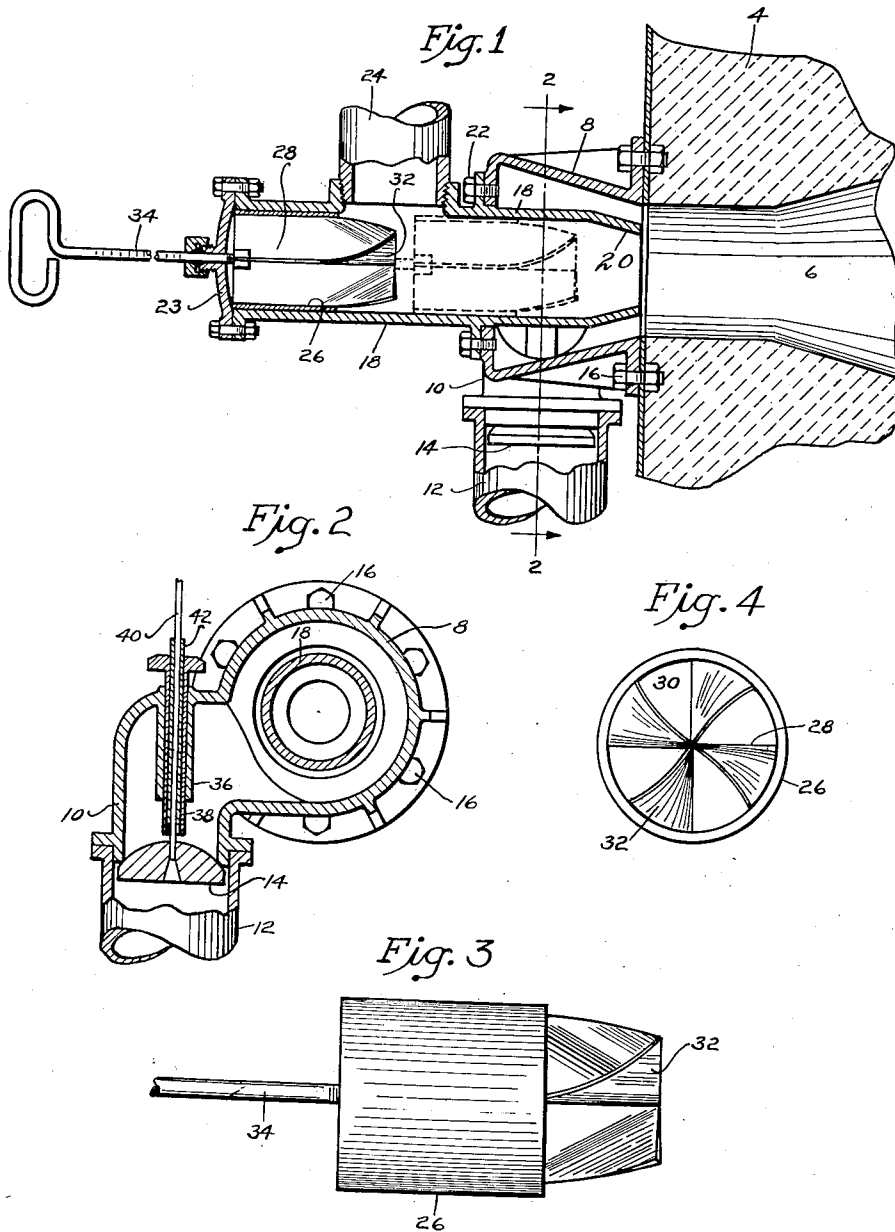
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GAS BURNER

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GAS BURNER

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This invention relates to gas burners and has among its objects to provide a gas burner that shall be particularly well adapted for utilizing raw producer gas as fuel; that shall be provided with means for readily varying the length of flame; and that shall be simple in construction and efficient in operation.

Referring to the drawing wherein the preferred form of this invention is shown;—

Fig. 1 is an axial sectional view of improved burner, the same being shown as applied to a furnace wall wherethrough the burner fires;

Fig. 2 is a transverse section on line 2—2 of Fig. 1;

Fig. 3 is an enlarged side elevation of a detail shown in Fig. 1, and

Fig. 4 is an end view of the detail shown in Fig. 3.

In the drawing, 4 indicates a furnace wall through which extends a passage 6 which serves as a throat wherein more or less complete mixing of the air and gas discharged from the burner may take place before being ignited.

The burner comprises among other things a casing 8 at one side of which is a conduit 10 adapted to be coupled to a gas supply main 12. The entrance to the conduit is controlled by a suitable valve 14 shown as of hemispherical form adapted to seat against the rim of the conduit. The manner of supporting the valves will be described in detail hereinafter. The casing 8 is adapted to be secured to the furnace wall by any suitable securing means 16, it being noted that the end opening in the casing is axially aligned with the passage 6 in said wall. It will also be noted that the interior chamber formed by the casing is circular in cross section and that the casing walls flare outwardly and constitute as it were the entrance cone to the throat or passage 6 in the furnace wall, said passage preferably comprising a

straight run portion and an outwardly flaring portion whereby the throat 6 and casing together form as it were a Venturi tube.

Projecting into the casing 8 is a conduit 18 the discharge end of which preferably converges to form a nozzle 20, it being noted that the nozzle terminates adjacent the restricted outlet from the casing. The conduit 18 is fixedly secured to the end wall of the casing 8 by any suitable securing means 22 or if desired the conduit and casing may be cast in one piece.

The conduit 18 extends a substantial distance beyond the end wall of the casing 8 and its outer end is closed by a removable cap 23. The conduit intermediate its ends is apertured and adapted for connection with an air supply pipe 24 which is connected with a source of air under pressure. Positioned within the conduit 18 and axially thereof is a tubular member 26 of sufficient length to serve as a sleeve valve for closing the aperture through which the air pipe 24 delivers. Positioned within said sleeve 26 and of a length to extend therebeyond is a device comprising a plurality of radially extending partitions 28 whereby a plurality of independent passages 30 are formed within the sleeve. The projecting ends of the partitions are curved or bent in the same direction circumferentially of the sleeve as indicated at 32 and consequently when air is passing through the sleeve it will have imparted to it a rotary or whirling motion as will be readily understood. The partitions are preferably formed of sheet metal and are fixedly secured within the sleeve in any suitable manner.

As previously stated the sleeve 26 is adjustable within the conduit 18, adjustment being effected by a rod 34 fixedly secured to the partitions at the outer end thereof, the rod passing through the cap 23. It will be noted that the conduit 18 is of such length between its nozzle 20 and the air supply pipe

24 that considerable adjustment of the sleeve may be made without restricting the inlet wherethrough the pipe 24 delivers into the conduit.

5 It follows that when the sleeve 26 is at the extreme left as shown in full lines in Fig. 1, the air delivered by the pipe will be discharged from the nozzle 20 without rotary motion whereas when the air must pass through the sleeve 26 there will be imparted to it a rotary motion. In either case the air discharged from the conduit 18 will have an inducing effect on the gas within the casing 8 and hence cause it to flow into the throat 15 along with the air with consequent mixing of the air and gas.

It will be readily appreciated that less rapid mixing of the air and gas will occur when the air leaves the nozzle 20 without rotation about its axis than when the air leaves the nozzle with rotation about its axis. It will also be appreciated that the more complete the mixing of the air and gas the more rapidly will the mixture burn and hence the shorter the length of flame. The present invention therefore provides a simple means for varying the length of flame by varying the degree of mixing of the air and gas.

As previously stated the sleeve 26 has a considerable range of adjustment between the pipe 24 and nozzle 20. The closer the curved ends 32 of the partitions are to the outlet end of the nozzle 20 the greater is the degree of rotation of the air since the less is the friction between the air and the walls of the conduit 18 and the farther away from the nozzle said ends are the less the degree of rotation of the air due to friction between the air and the walls of the conduit. The rapidity of mixing of the air and gas can therefore be controlled over a very considerable range even when rotation is imparted to the air and hence the length of flame can be controlled over a correspondingly great range. In order that the mixture when rapidly mixed may ignite before leaving the confines of the passage 6, the latter is flared outwardly as indicated to permit the mixture to expand with consequent reduction of velocity.

From the foregoing it will be seen that the sleeve 26 serves two major purposes: one as a carrier for the whirl-producing means 32 and the other as a valve for controlling the admission of air into the conduit 18. It will, however, be appreciated that omission of the sleeve valve would not interfere with the mode of operation of the whirl-producing means and hence it is within the spirit of the invention to dispense with the sleeve valve.

Due to the fact that producer gas contains tarry substances, the gas valve 14 is liable to stick. The present invention therefore provides a simple means for releasing the

valve. Projecting into the elbow of the conduit 10 is a tubular member 36. Slidably positioned within said member is a tube 38 the outer end of which is provided with a head adapted to withstand the blows of a hammer. In case the valve should be stuck to its seat it may be released by forcing the tube 38 thereagainst. The valve is supported by a cable 40 which passes through the tube 38, the cable being actuable by any suitable means not shown to lift the valve. Since the tube 38 is of considerable diameter there may be telescoped over the cable a sleeve 42 which is slidably mounted in the tube to form a gas tight seal.

From the foregoing description it will be seen that the present invention provides a simple and practical means for forming and delivering a mixture of air and gas for burning in close proximity to the mixture forming means. While the invention has special utility in connection with raw producer gas, it will be readily appreciated that in its broader aspects it has utility with other kinds of fuel gas.

What I claim is:

1. In apparatus for forming and delivering a mixture of air and gas, the combination with an air conduit terminating in a discharge nozzle and a casing defining a gas chamber surrounding the nozzle-end of the conduit and forming therewith an annular passage through which gas may flow from the casing for mixing with the air discharged from said nozzle, of means within the conduit adapted to impart rotary motion to the air leaving the nozzle, and means for adjusting said means longitudinally of said conduit.

2. In apparatus for forming and delivering a mixture of air and gas, the combination with an air conduit terminating in a discharge nozzle and a casing defining a gas chamber surrounding the nozzle-end of the conduit and forming therewith an annular passage through which gas may flow from the casing for mixing with the air discharged from said nozzle, of means within the conduit adapted to impart rotary motion to the air leaving the nozzle, said means comprising a plurality of radially extending partitions provided with a spiral twist, and means for adjusting said means longitudinally of the conduit.

3. In apparatus for forming and delivering a mixture of air and gas, the combination with an air conduit terminating in a discharge nozzle and a gas chamber surrounding the nozzle-end of the conduit and forming therewith an annular passage through which gas may flow from the casing for mixing with the air discharged from said nozzle, of means within the conduit adapted to impart rotary motion to the air leaving the nozzle, means for adjusting said means lon-

gitudinally of the conduit, and means delivering air into said conduit intermediate the ends thereof.

4. In apparatus for forming and delivering a mixture of air and gas, the combination with an air conduit terminating in a discharge nozzle and a gas chamber surrounding the nozzle-end of the conduit and forming therewith an annular passage through which gas may flow from the casing for mixing with the air discharged from said nozzle, of means within the conduit adapted to impart rotary motion to the air leaving the nozzle, means for adjusting said means longitudinally of the conduit, means for delivering air into said conduit intermediate the ends thereof, and means associated with the first named means for shutting off the flow of air into the conduit.

5. In apparatus for forming and delivering a mixture of air and gas, the combination with an air conduit terminating in a discharge nozzle and a gas chamber surrounding the nozzle-end of the conduit and forming therewith an annular passage through which gas may flow from the casing for mixing with the air discharged from said nozzle, of means for delivering air to said conduit intermediate the ends thereof, a sleeve within said conduit for controlling the admission of air thereinto, and means movable with said sleeve for imparting whirling motion to the air passing through the sleeve.

6. The combination with a furnace wall having a passage extending therethrough, of a gas supply chamber secured to said wall and having an outlet opening directly into said passage, the walls of the chamber flaring outwardly away from said passage, a conduit projecting into said chamber and forming with the walls thereof at the outlet therefrom an annular passage through which the gas enters said passage, means for supplying air to said conduit intermediate its ends, a spiraled member within said conduit, and means for adjusting said member axially of the conduit.

7. The combination with a gas supply chamber and a mixing throat whereinto said chamber discharges, of an air supply tube projecting into said chamber and discharging into said throat and having an inlet intermediate its ends, a longitudinally vaned member slidably mounted within said tube and being formed to impart rotary motion to fluid flowing between the vanes, and means for moving said member from that end of the tube most remote from said throat into that portion of the tube between said throat and said inlet.

8. The combination with a gas supply chamber and a mixing throat whereinto said chamber discharges, of an air supply tube projecting into said chamber and discharging into said throat and having an inlet in-

termediate its ends, a longitudinally vaned member slidably mounted within said tube and being formed to impart rotary motion to fluid flowing between the vanes, means for moving said member from that end of the tube most remote from said throat into that portion of the tube between said throat and said inlet, and a sleeve movable with said member and wherein the latter is mounted.

In testimony whereof I affix my signature.

HUGH B. BARBER.

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