

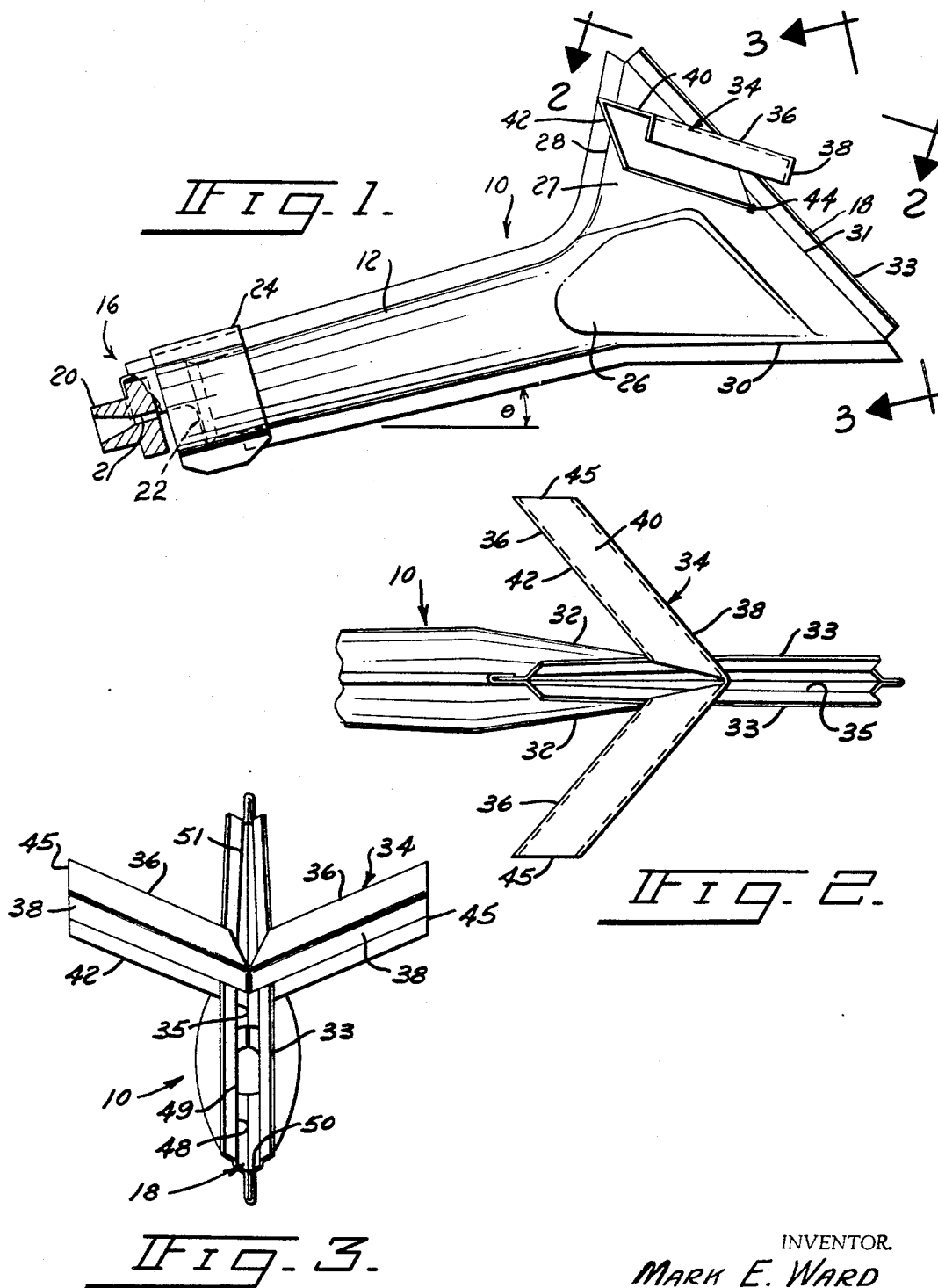
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GAS BURNER

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GAS BURNER

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ABSTRACT OF THE DISCLOSURE

This invention relates to a flashback resistant gas burner with a flame deflecting cross-lighter for use in a bank of such burners. The gas burner has a horizontally disposed fuel-air mixing tube which expands vertically and converges transversely in a downstream direction forming an elongated large-area discharge port. The port has substantial height and the upper portion of the port is narrower than its lower portion. The cross-lighter deflects and transversely conveys, by means of a narrow diverter member and attached channel members, only a small portion of the flame issuing from the port. The diverter member is spaced sufficiently in front of a central portion of the port to be subjected to the heat of the flame so as to prevent carbon or lint build-up thereon.

In supplying heat to a furnace by gas flame means, it sometimes becomes necessary to use different kinds of gases. Some gases, such as propane and manufactured gases, are more subject to flashback than are others, so that burners may work satisfactorily with, for example, natural gas, but they present problems when certain other gases are burned. Flashback usually occurs during turn-down, at ignition or extinction.

The usual practice in the art is to place a plurality of burners side by side and provide means for transferring the flame from one burner to another so that one pilot may be used to ignite all burners. This is accomplished by diverting a portion of the burning gas and directing it to an adjacent burner. Prior art burners use flame deflectors that divert the gases from a position relatively close to the burner venturi, with the result that the gases are at a fairly low temperature, about 400° F., when they are so diverted. Consequently, lint that normally tends to collect within the flame deflector is not burned off and eventually adversely affects the function of the deflector. In addition, if the flame is gas rich, carbon deposits will take place within the gas deflector and again influence the performance of the burner.

It is, therefore, an object of this invention to provide a gas burner that can burn a wide variety of gases.

It is another object of this invention to provide a gas burner for burning all fuel gases without having a problem of flashback.

It is still another object of this invention to provide a burner having a unique discharge port.

It is another object of this invention to provide a burner that is self-purging of any gas-air mixture at time of extinction.

It is still a further object of this invention to provide a flame deflector that is able to eliminate any lint or carbon that may tend to be deposited thereon or therein.

It is still another object of this invention to provide a gas burner with a flame deflector that deflects a portion of the burner flame after the same reaches a relatively high temperature.

Other and further objects of this invention will be apparent from the following description and claims and may which, by way of illustration, show the preferred embodiment understood by reference to the accompanying drawings

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ment of the invention and what is considered to be the best mode of applying the principles of this invention.

In the drawings:

FIG. 1 is a side elevational view of a gas burner embodying the principles of this invention.

FIG. 2 is a plane view of the discharge port of the burner shown in FIG. 1.

FIG. 3 is a front view of the burner taken along the lines 3-3 of FIG. 1.

Referring now to the drawings, a burner embodying the principles of this invention is shown generally at 10 and includes an elongated venturi tube 12 having an input end 16 and an output end 18. Gas is supplied to the tube 12 through a spud 20, having an orifice 21 therein; which spud is joined to a gas supply header (not shown) and is attached in a conventional manner to the input end 16 of the burner. An air opening 22 is provided in the input end 16 adjacent the gas supply means. Disposed about the input end 16 of the burner is an air sleeve 24 that regulates the amount of air allowed to enter the air opening 22, which air is subsequently mixed with the supplied gas, which mixture is ignited as it exits the output end 18.

At a location, generally indicated by 26, in the proximity of the output end 18, the tube 12 changes its general configuration in that it extends vertically upwardly and downwardly to form end members 28 and 30 and the resulting sides 32 converge inwardly a short distance as they approach the output end 18 and eventually extend parallel to one another, thereby forming a relatively deep discharge port, indicated generally by 27. The venturi tube 12 increases in cross sectional area as it extends from the input end 16 to the output end 18. This gradual increase continues despite the change in configuration. Each side 32 has flanges 33 extending outwardly from the ends 31 thereof at an angle of approximately 35°, the ends 31 being in a plane at an angle less than 90°, but greater than 45° relative to the axis of the tube 12, the preferred angle being approximately 60°. The ends 31 of the sides 32 define a discharge opening 35. The flanges 33 are provided to direct the flame issuing from the outlet end 18, the angle 35° allowing a preferred flame pattern.

Attached to the burner 10 is a three-sided channeled flame deflector 34. The flame deflector 34 has a pair of arms 36 which are joined in front of the discharge opening 35 and form a V-shaped member. Each of the arms 36 has a member 38 spaced in front of the discharge opening 35 and extending transversely relative to the discharge port 27, these members being provided to direct a portion of the burning gas that emerges from the discharge port generally transversely. The upper member 40 of each arm has a flat rectangular shape that sweeps upwardly and toward the burner. This upper member 40 extends substantially along the horizontal and supports directing member 38. Depending from the upper member 40 and spaced relative to the diverging member 38 is a back member 42 which completes the three-sided channel to contain the burning gas along its directed path. The back member also provides means for attaching the flame deflector 34 to the burner as by a weld shown at 44. The ends 45 of the arms 36 are constructed to form a flat surface and form an abutting relationship with an identical flame deflector when placed adjacent thereto. In this way, a plurality of burners may be placed next to one another so that only one pilot (not shown) is required to ignite a bank of burners. The deflecting element 38 of flame deflector 34 is spaced a distance from the discharge opening 35 so that the gas has sufficient time to combust and reach a relatively high temperature, i.e., a temperature of approximately 1400° F., before being diverted. Because of this, not only is lint that tends to be deposited

on the deflectors burned away, but the temperature is sufficiently high to oxidize any carbon deposits that might result from too rich a gas mixture.

The discharge opening 35, as seen in FIG. 3, is formed by a wall portion 48 of the sides 32 and a bottom wall 50. The bottom wall 50 is generally horizontal while the side walls each have a portion 49 that extends substantially parallel to one another a short distance from the bottom wall 50. Each portion 49 is equal to approximately $\frac{1}{3}$ the length of a side wall 48, after which the remaining portions 51 of the side walls 48 converge toward one another until they substantially meet at the top of the discharge opening 35. The converging portions 51 may either intersect one another or be joined by a small member at the top of the opening 35. It will be observed that the parallel sides 49 of the discharge port are generally aligned with a line that extends from the center of the input end 16 and along the horizontal to the discharge opening 35, for the burner 10 is placed at an angle θ relative the horizontal. It has been found that with this particular type of discharge port 27 various gases, including natural, liquified petroleum and manufactured, may be burned without the threat of any flashback during ignition, turndown or extinction. Although the exact reason for this phenomenon is not known, it is believed that the flashback which normally occurs with other burners is prevented because the converging upper end of the discharge opening 35 in cooperation with the depth of the discharge port 27 serves to hold the flame at the top of the port where the flame normally tends to rise, thereby preventing the gas from becoming diffuse.

While only a single embodiment of this invention has been shown and described, it is understood that many changes can be made therein without departing from the scope of this invention as defined by the following claims.

I claim:

1. In a gas burner, the combination comprising a venturi tube having an inlet end and an outlet end, said tube increasing in cross sectional area as it extends in a generally horizontal direction from said inlet end to said outlet end, said tube being generally conical from said inlet end to a location intermediate said ends, said tube expanding vertically and converging transversely as it extends from said location to said outlet end to form a discharge port, said discharge port comprising a pair of spaced side walls defining an elongated vertically extending opening, with a lower portion of said side walls extending substantially parallel to one another and the remainder of said side walls converging upwardly toward one another.

2. The gas burner of claim 1 wherein said side walls are parallel to one another a distance equal to approximately $\frac{1}{3}$ the length of a side wall and the remaining portions of said walls converge toward one another.

3. The burner of claim 1 wherein said discharge port comprises a bottom wall, a pair of spaced side walls defining an opening and extending vertically from said bottom wall substantially parallel to one another over a substantial portion of the length of said side wall, said side

walls then converging toward one another and joining to enclose said opening.

4. In a gas burner, the combination comprising a venturi tube having an inlet end, an outlet end, and increasing in cross sectional area as it extends in a generally horizontal direction from said inlet end to said outlet end, said tube being generally conical from said inlet end to a location intermediate said ends, said tube expanding vertically and converging transversely as it extends from said location to said outlet end, thereby forming a discharge port, said discharge port comprising a pair of spaced side walls defining an elongated vertically extending opening, the lower portion of said side walls extending substantially parallel to one another and the remaining portion converging upwardly toward one another, a pair of arms extending transversely from said side walls, means for attaching said arms to said tube, and a flange depending from each of said arms, said flanges being spaced relative to said discharge port.

5. The gas burner of claim 4 wherein each of said parallel portions is equal in length to approximately $\frac{1}{3}$ the total length of one of said side walls.

6. The burner of claim 5 wherein said parallel portions are axially aligned to said cylindrical portion.

7. The combination of a gas burner having a discharge port and a flame deflector for deflecting flame issuing from the discharge port comprising: a pair of channel shaped arms, disposed generally downstream from the discharge port, having connected ends at a location generally aligned with the axis of the discharge port and extending transversely beyond the perimeter of the burner, each of said arms having a support member with a flat surface, a first member and a second member, said first member depending from said support member and having a depending length substantially less than the length of the discharge port, said second members depending from each of said support members and spaced upstream relative to said first member, at least one of said second members being attached to the gas burner, whereby said arms deflect a portion of the flame issuing from the discharge port and act as cross lighters for the combination burner and flame deflector when placed adjacent a like combination.

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