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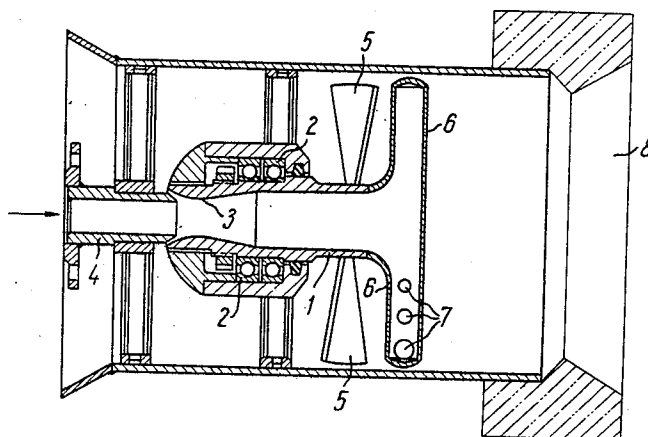
[54] **TURBINE BURNER**
4 Claims, 1 Drawing Fig.

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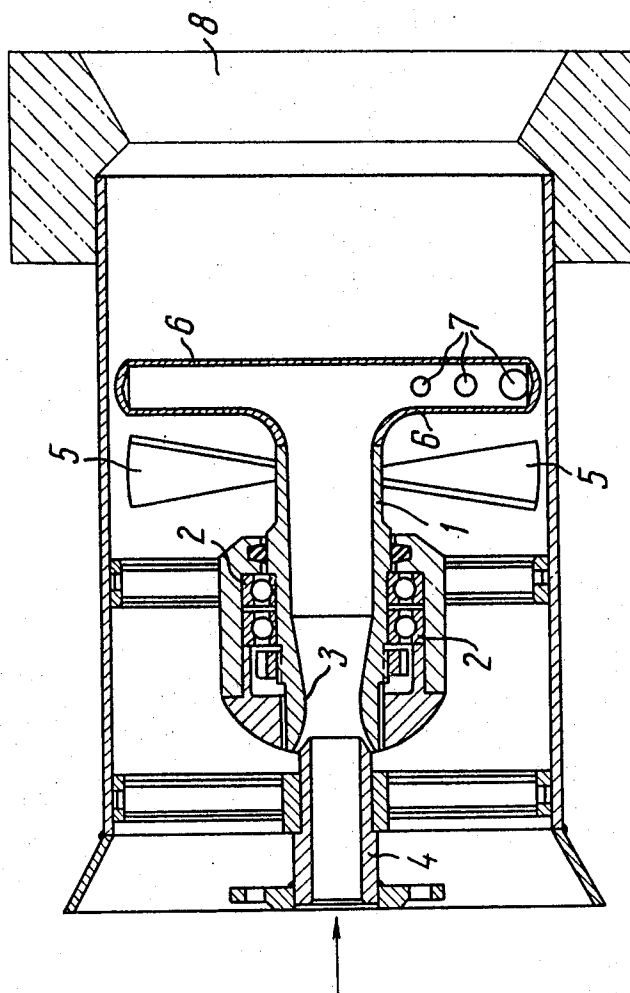
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ABSTRACT: A turbine burner including a housing in which is journaled a hollow shaft, which shaft is provided with a longitudinal channel in the form of a venturi tube. A fixed gas inlet manifold is supported in the housing and extends into the converging section of the venturi tube and is spaced therefrom. A perforated exhaust manifold is fixed on the hollow shaft in communication therewith, through which perforations the gas is exhausted and directed outwardly into the housing for imparting a torque onto the hollow shaft so that the hollow shaft is rotated thereby.



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TURBINE BURNER

The present invention relates to burner devices for burning natural gas in fire chambers of steam boilers and industrial furnaces and, more particularly, to turbine burners.

Commonly known are turbine burners wherein kinetic energy of a gas discharged from an outlet in exhaust manifolds secured onto a hollow shaft is used to rotate said shaft. Set on the shaft are the blades of a fan circulating air required for combustion. An advantage of turbine burners over the other types is the absence of power consumption for forced air feed and of capital expenditures on thrust and blow devices.

However, turbine burners suffer from a major disadvantage in that when gas flows from a stationary gas inlet manifold to the hollow shaft space, imperfect sealing results in gas leakage. The pressure in gas exhaust manifolds drops, the kinetic energy of gas currents would be reduced to lessen the useful torque. Two kinds of sealing are conventionally used, i.e., the labyrinth and the gland. The former, being perfect from the viewpoint of its long service life, cannot guarantee, however, a prevention of gas leakage. Besides, the provision of labyrinth sealing makes the burner more costly. The gland sealings ensure air-tightness only within the first minutes after their packing. Because of the friction of a gland sealing against the rotating shaft, a clearance results eventually leading to a more intensive gas leakage. Furthermore, the friction in the gland sealing reduces the useful torque. The above-mentioned disadvantages of sealings used restrict the use of turbine burners so heavily that the latter find scarce application despite all of their above-said essential advantages.

It is an object of the present invention to provide a turbine burner for obviating the above-said disadvantages.

According to the invention, this is achieved by arranging the exit end of the gas inlet manifold with a certain clearance inside the initial portion of the hollow shaft, said portion being made as a venturi tube. This helps provide conditions for a reduced gas pressure within said clearance area.

It is feasible, in an exemplary embodiment of the present invention, to make the inner diameter of the gas inlet manifold correspond to the smallest inner diameter of the venturi tube within 1.0:1.0—1.05:1.0 range.

The present invention will be more apparent from the following description of an exemplary embodiment thereof, reference being made to the appended drawing which shows a longitudinal section of the proposed turbine burner.

The turbine burner comprises a hollow shaft 1 set on ball bearings 2. Initial portion 3 of the hollow shaft 1 is made as a venturi tube which houses, with a certain clearance, the exit end of a gas inlet manifold 4. The relation of the inner diameter of said manifold 4 to the smallest diameter of the venturi tube is within 1:1.0—1:1.05 range.

The hollow shaft 1 carries blades 5 of a fan and perforated gas exhaust manifolds 6. Outlets 7 are such that gas currents

outgoing from the diametrically opposite manifolds 6 form a couple of forces creating the torque under the action of a jet force of the tangential gas currents. Because of the torque effect, the blades 5 of an axial fan rotate together with the hollow shaft 1 on which they are set. As a result, air mixing with the gas currents goes to a fire chamber through a port 8. Escaping from the gas inlet manifold 4 is a gas having varying kinetic energy depending firstly upon the degree of narrowing of the hollow shaft 1, the inner space of which is made to conform to the profile of the venturi tube, and secondly upon the resistance of a flow path. Because of this (according to the Bernulli equation), the static pressure of the gas flow in the clearance between the rotating and stationary portions depends upon the resistance of the system. When the static pressure is greater than the atmospheric pressure, gas will go out of the clearance; if it is less, air is ejected from outside into the burner. By selecting the flow path resistance, it is possible to secure a complete absence of gas leakage and of air ejection from outside. It has been proved experimentally that the best effect is achieved when the relation of the inner diameter of the gas inlet manifold to the smallest diameter of the venturi tube is from 1.0:1.0 to 1.05:1.0.

With the above-said condition observed, the gas current functions as a reliable hydraulic gate.

We claim:

1. A turbine burner comprising a housing, a hollow shaft rotatably journaled in said housing and provided with a channel in the form of a venturi tube having a converging and a diverging section fixed relative to one another, a gas inlet manifold fixedly mounted in said housing and provided with an end portion extending longitudinally into the converging section of said venturi tube and annularly spaced therefrom, said end portion of said gas inlet manifold being adapted for supplying gas directly into said converging section whereby the gas is smoothly passed in an uninterrupted manner from said converging section to said diverging section, and an exhaust manifold fixedly mounted on said hollow shaft in communication with said shaft to rotate therewith, said exhaust manifold being provided with a plurality of perforations through which a gas is to be exhausted into said housing for imparting rotation to said shaft.

2. A turbine burner as claimed in claim 1, including ball bearings upon which is journaled said hollow shaft.

3. A turbine burner as claimed in claim 1, including a plurality of fan blades fixedly mounted on said hollow shaft to rotate with said shaft and radially extending outwardly of said shaft.

4. A turbine burner as claimed in claim 1, wherein the ratio relationship between the inner diameter of said gas inlet manifold and the smallest inner diameter of said venturi tube is within 1.0:1.0—1.05:1.0 range.

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