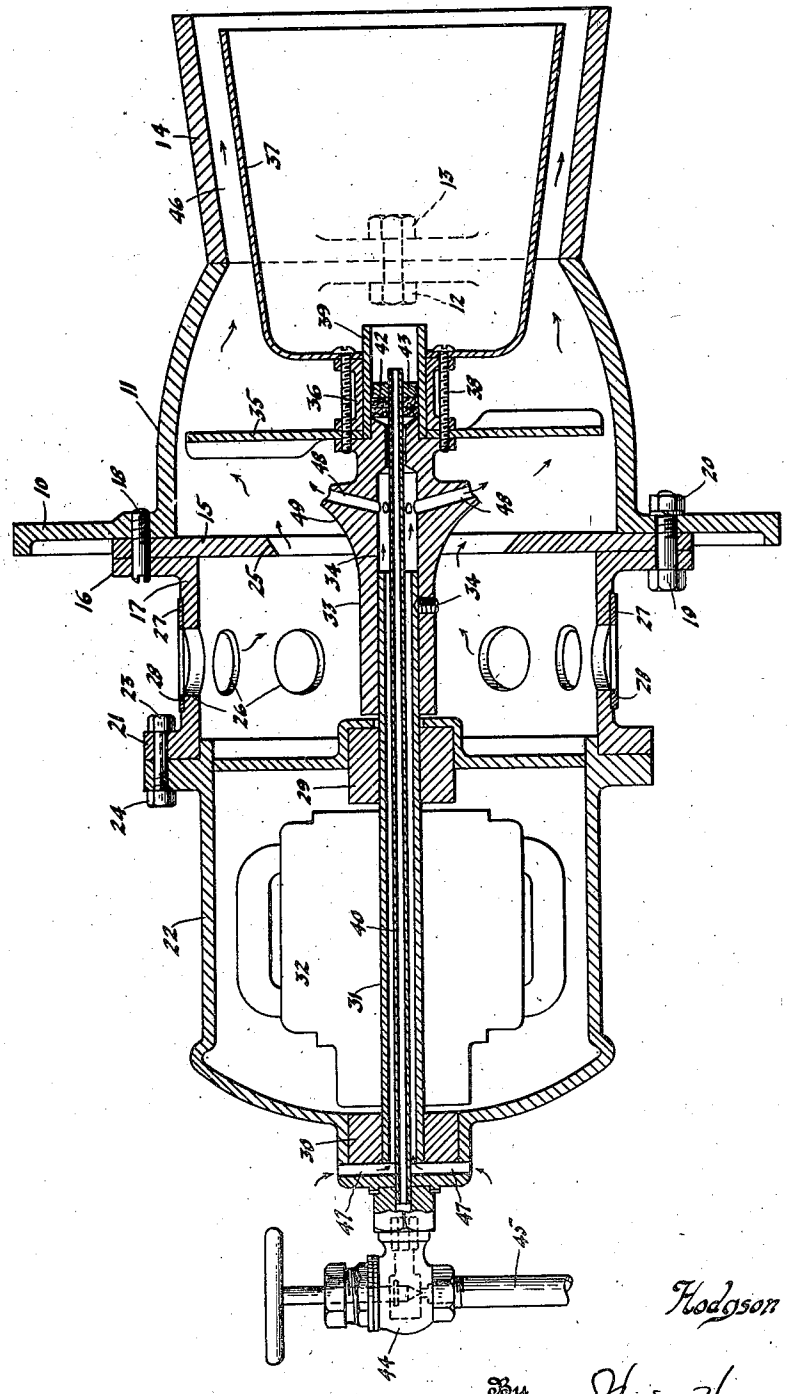
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OIL BURNER

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OIL BURNER

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This invention relates to means for passing air through revolving hollow shafts such as the shafts of motors wherein it is desirable to reduce the temperature of the shaft within the motor, and is particularly applicable to a construction in which an oil duct extends through the hollow shaft of a motor such as occurs in many conventional designs of oil burning apparatus and in which it is desirable to prevent the oil in the duct from absorbing a material amount of heat from the motor.

The principal object of the present invention is to provide a simple and inexpensive means for causing the flow of air through a rotating hollow shaft.

Another object is to provide means for causing a flow of air through a rotating hollow shaft open at at least one end thereof, comprising the provision of outwardly extending passages connecting the interior of the shaft with the atmosphere exterior thereto whereby upon the rotation of the shaft the centrifugal force acting on the air in outwardly extending passages will cause air to be drawn in at the end of the shaft and discharged therefrom through the openings.

Another object is to provide means for causing a flow of air through a hollow rotating shaft provided with an air displacing device fixed thereto comprising passages connecting the interior of the shaft with the low pressure area adjacent the air displacing device.

A further object is to provide a means for preventing an excessive heat transfer to a liquid passing through a duct within a hollow motor shaft comprising the admission of air to the center of the shaft and the provision of a centrifugal type of air displacing device connected with the interior of the shaft whereby the suction created within the air displacing device will cause the air to be drawn through the shaft about the duct.

The above being among the objects of the present invention the same consists in certain features of construction and combinations of parts to be hereinafter described with reference to the accompanying drawing, and then claimed, having the above and other objects in view.

In the accompanying drawing:

Fig. 1 is a vertical longitudinal sectional view taken centrally through an oil burning apparatus.

Although the present invention is applicable to a wide variety of uses wherein it is desired to cause a flow of air through a hollow rotating shaft, it is particularly applicable to oil burning apparatus of that conventional construction wherein an electric motor is provided with an air displacing device and an atomizing cup secured to its shaft, the fuel being fed to the cup through a tube or duct extending through the shaft of the motor which is made hollow for that purpose, and accordingly a suitable embodiment of the present invention is shown in the accompanying drawing in connection with an apparatus of this type.

In the construction shown in the accompanying drawing an oil burning apparatus is shown comprising a supporting frame member 10 which may be suitably secured over a suitable opening in a furnace or other heating apparatus and which is provided with an inwardly extending casing portion 11 to the inner end of which is suitably secured by the bolts 12 and nuts 13 an outwardly diverging ring like portion 14. To the outer face of the frame member 10 is secured a plate member 15 by clamping the same between the frame member 10 and the radial flange 16 of the supporting ring 17, the plate member 15 and the supporting ring 17 being located relative to the frame 10 by means of the pins 18, and being secured in that position by bolts such as 19 and nuts 20. The rear face of the member 17 is provided with a radially extending flange 21 to which the casing or frame 22 of an electric motor is secured by means of bolts 23 and nuts 24. The plate member 15 is provided with an enlarged central aperture 25. The member 17 is provided with a plurality of openings 26 through the walls therefor for the purpose of admitting air to the interior of the same. A band member 27 provided with openings 28 therein spaced in matching relationship with respect to the

openings 26 is slidably positioned on the outer face of the member 17 over the openings 26 in order to control the effective area of the openings 26. The electric motor is provided with bearing members 29 and 30 which rotatably support the hollow motor shaft 31 to which the armature 32 is fixed. The shaft 31 extends into the interior of the member 17 where it is provided with a member 33 secured thereto for equal rotation therewith by means of a set screw such as 34 or other suitable means, the member 33 being provided with a central opening 34 in which the shaft 31 is received. To the inner end of the member 33 is secured a fan 35 by clamping the same between such end and the collar member 36. A vaporizing cup 37 is secured to the inner end of the collar 36 by means of the screws 38 which extend through the bottom of the cup through the collar member 36, fan 35 and into the member 33, thus serving to hold all of these parts together in assembled relationship. Within the collar 36 is secured a short tubular member 39 projecting into the interior of the cup a short distance inwardly of the bottom thereof. Extending through the hollow interior of the shaft 31 in freely spaced relationship with respect to the interior of the same is a tube or duct 40, it being extended from the rear end of the motor through the shaft 31, member 33 and into the interior of the tubular member 39 where it terminates between the ends thereof. The forward end of the tube 40 is suitably journaled in the forward end of the member 33. Suitable packing such as 42 secured about the tube 40 within the member 39 by means of the nut 43 serves to seal the interior of the shaft 31 and member 33 against leakage to or from the interior of the cup 37 about the tube 40. The other end of the tube 40 may be suitably connected to a control valve such as 44 to which a suitable fuel under pressure may be fed by a pipe such as 45. Upon rotation of the motor air is drawn through the openings 26 by the fan 35 and is forced through the annular passageway 46 between the casing member 14 and cup 37. The fuel from the pipe 45 passes through the valve 44 and then through the tube 40 to the interior of the member 39 which because of its rotation throws the oil off of the free end thereof in the form of a film into the cup member 37. Because of the diverging relationship of the walls of the cup 37 the fuel disposed in the same is deposited over the interior surface thereof in a thin film which is acted upon by centrifugal force and carried out to the open end of the cup where it is thrown off of the same in a finely divided state into the flow of air passing through the annular passage, suitable means (not shown) being provided for igniting the resultant mixture of air and fuel.

In constructions of this type it is important that the fuel which is introduced to the vaporizing cup 37 is not allowed to reach a temperature before being thrown out of the same into the path of the air such that the fuel will crack and free carbon be deposited upon the walls of the cup. For this reason it is preferable to introduce the fuel into the cup at the lowest temperature that can be conveniently employed with proper regard for surrounding circumstances. It will further be apparent that in constructions of the type described wherein the fuel duct extends through the interior of an electric motor and no suitable means are provided for the proper ventilation of the space between the duct and the interior walls of the motor shaft, the heat losses in the motor which are transmitted to the shaft and raise the temperature thereof transfer heat to the fuel duct and materially increase the temperature of the fuel flowing through the same. As previously stated, it is the principal object of the present invention to provide means for causing a flow of air through shafts such as described in connection with the construction shown in the accompanying drawing, and this means as applied to the construction shown may be suitably accomplished as follows.

A plurality of openings 47 are provided in the rear end of the motor casing 22 connecting the interior of the shaft 31 with the atmosphere at this point. The member 33 which rotates with the shaft 31 is provided with a plurality of outwardly extending or radially disposed openings 48 connecting the opening 34 in the member 33 with the atmosphere exterior thereto at that point. From this it will be seen that upon rotation of the motor together with its shaft 31 and the member 33, the air in the openings 48 will be affected by the centrifugal action on the same and will be thrown outwardly, and that as such air is thrown outwardly through the openings 48 it is replaced by air from the interior of the shaft 31 which in turn is replaced by air drawn through the openings 48, causing a constant flow of air to be set up through the shaft 31 and about the tube 40, thereby carrying off the heat that would otherwise be transmitted to the fuel in the tube 40. In order to increase the flow of air through the shaft 31 as described, it is preferable in the construction shown that the passages 48 terminate at their outer ends in the low pressure area immediately back of the fan blades 35 whereby the difference in pressure between such low pressure area and the atmosphere adjacent the outer ends of the openings 47 will exert an additional force on the air to cause it to flow through the shaft 31. This same principle may be applied to those constructions wherein a centrifugal fan is employed in place of the axial displacement type of fan shown, the openings 48 in

such case opening into the low pressure area adjacent such centrifugal fan. The force acting on the air to cause it to flow through the shaft 31 is further increased in the construction shown by increasing the diameter of the member 33 at the point where the openings 48 are provided and also forming the member 33 adjacent the openings 48 to provide a surface 49 diverging outwardly in the direction of the flow of air through the burner casing so that the air in flowing past the portion 49 will tend to create, by reason of its movement, a low pressure area immediately over the outer ends of the openings 48. This may be further increased by so positioning the surface 49 in respect to the plate member 15 that the air flowing through the casing is accelerated due to the restricted opening 25.

It will be apparent from the foregoing that the invention herein set out is capable of a wide variety of uses and applications of which the construction shown in the accompanying drawing may be taken as an illustration, it being readily apparent, for instance, that it will not always be necessary to provide a member such as 33 on the shaft 31 but that where conditions permit openings such as 48 may be formed directly in the shaft 31 to effect the same results as herein pointed out, and although but one application of the present invention has been pointed out its applications to other constructions is readily apparent to those skiled in the art, and formal changes may be made in the specific embodiment of the invention described without departing from the spirit or substance of the broad invention, the scope of which is commensurate with the appended claims.

What I claim is:

1. In combination, a casing, a motor supported at one end thereof provided with a hollow shaft, a vaporizing cup at the opposite end of said casing driven by said motor, and an air displacing device fixed on said shaft between said motor and said cup and driven thereby, the interior of said shaft being connected with the low pressure area adjacent said device whereby air will be drawn through said shaft upon rotation of said motor.

2. In combination, a casing, an electric motor supported at one end thereof provided with a hollow shaft open to the air at one end, a member fixed to said shaft, an air displacing device secured to said member within said casing, a vaporizing cup fixed to said member beyond said air displacing device from said motor, a stationary oil tube extending through said shaft and discharging into said cup, said tube being spaced from the interior walls of said shaft, and sealing means between said member and said tube adjacent said cup, said member being provided with a plurality of openings connecting the space between the interior walls of said shaft and said tube with the exterior surface of said member.

3. In an oil burner, in combination, a line of hollow shafting, a motor armature on one end of said shafting, a vaporizing cup on the other end of said shafting, a fan on said shafting between said cup and armature, an oil duct extending through the bore of said shafting in spaced relation to the walls of said bore and adapted to discharge oil into said cup, and openings in said shafting between said fan and said armature connecting said bore with the low pressure area back of said fan for causing air to be drawn through the bore of said shafting about said duct.

4. In an oil burner, in combination, a line of hollow shafting, a motor armature carried at one end of said shafting, a vaporizing cup carried at the other end of said shafting, a combustion air supplying fan carried by said line of shafting between said cup and said armature, and an oil duct extending through said line of shafting in spaced relation to the bore thereof and discharging into said cup, said line of shafting being provided with openings therein connecting the bore thereof with the low pressure area adjacent said fan whereby to cause a flow of air through said bore independently of said cup for cooling said armature and for limiting the heating of said oil duct.

5. In an oil burner, in combination, a line of hollow shafting, a motor armature carried at one end of said shafting, a vaporizing cup carried at the other end of said shafting, a combustion air supplying fan carried by said line of shafting between said cup and said armature, and an oil duct extending through said line of shafting in spaced relation to the bore thereof and discharging into said cup, said line of shafting being provided with an enlargement between said fan and said armature, said enlargement being provided with generally radially extending openings therein connecting the bore of said shafting with the air exterior thereto at a point adjacent the low pressure area of said fan whereby to cause a flow of air through said shafting about said duct independently of said cup.

6. In an oil burner, in combination, a line of hollow shafting, a motor armature carried at one end of said shaft, a vaporizing cup carried at the other end of said shafting, a combustion air supplying fan carried by said line of shafting between said cup and said armature, and an oil duct extending through said line of shafting in spaced relation to the bore thereof and discharging into said cup, and an enlargement on said line of shafting between said fan and said armature outwardly flared towards said fan and provided with a sharply receding face beyond its point of maximum diameter, said enlargement being provided with openings therein connecting

said face with the bore of said shaft whereby air will be drawn through said shaft about said duct not only by reason of the low pressure area adjacent said fan and the centrifugal action on the air in said openings, but also by reason of the flow of air set up by said fan sweeping over said enlargement and causing a low pressure area at said face.

7. In an oil burner, in combination, a casing, a motor in one end of said casing, a cup in the opposite end of said casing, a hollow shaft for said motor supporting said cup, a fan on said shaft between said cup and said motor, an oil duct extending through said shaft from one end thereof to the opposite end thereof in spaced relation with respect to the bore of said shaft for delivering oil to said cup, and means sealing the space between said bore and said duct adjacent said cup, said shaft being provided with generally radially disposed openings between said motor and said fan whereby air will be caused to flow through said shaft in said motor about said duct due to the centrifugal action on the air in said openings and due to the low pressure area adjacent said fan.

8. In an oil burner, in combination, a casing having an open end, a motor supported by said casing, a hollow shaft for said motor extending into said casing, a member secured to said shaft within said casing for equal rotation therewith, a vaporizing cup secured to the end of said member adjacent the open end of said cup, a fan secured to said member between said cup and said motor, an oil duct extending through said motor shaft and terminating within said cup, said duct being spaced from the bore of said shaft, and means preventing the passage of air between said shaft and said duct into said cup, said member being provided with an opening connecting the bore of said shaft with the low pressure area adjacent said fan whereby to cause a flow of air through said shaft independently of said cup.

9. In an oil burner, in combination, a casing, a motor supported at one end of said casing and provided with a hollow shaft extending into said casing, a vaporizing cup supported from said shaft in the opposite end of said casing, a wall in said casing between said cup and said motor restricting the free flow of air in said casing about said shaft at that point, a fan secured to said shaft between said cup and said wall, an enlargement on said shaft adjacent the point of restriction caused by said wall, said enlargement formed to provide a low pressure area adjacent a face thereof due to the flow of air at said point of restriction acting on said enlargement, said enlargement being provided with openings connecting said low pressure area with the bore of said shaft whereby to cause a flow of air through said shaft, and an oil duct extending through said shaft in spaced relation to the walls of its bore for discharging air into said cup and adapted to be cooled by said flow of air.

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