# United States Patent

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[54] **BURNER ASSEMBLY FOR COMBUSTION OF OIL**
**5 Claims, 5 Drawing Figs.**


[52] **U.S. Cl.** ..... **431/350,** 431/183, 239/424.5
[51] **Int. Cl.** ..... **F23d 13/24**
[50] **Field of Search** ..... 431/174, 183, 184, 350, 353; 239/424.5



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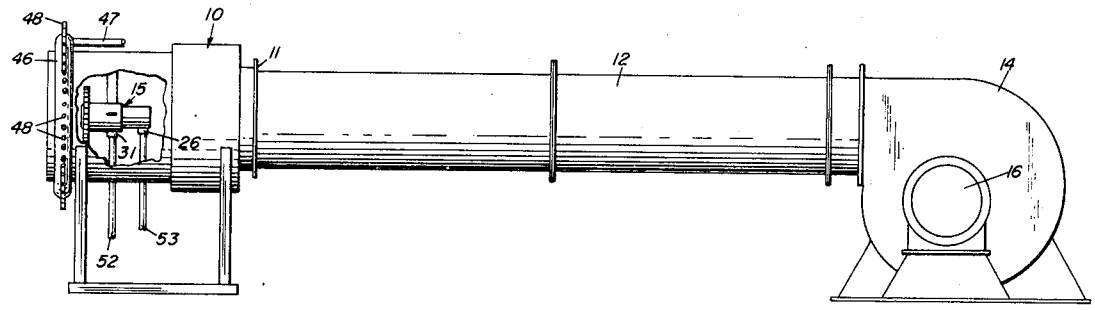
**ABSTRACT:** A burner assembly for the combustion of crude oil such as often escapes from offshore wells. The assembly includes means for breaking the oil into small droplets to facilitate the combustion thereof and structure adjacent the discharge ports for preserving ignition of the burning oil. A supply of air serves to direct the flame and the heat of combustion away from the apparatus and personnel. The assembly includes structure which develops a screen of water for the absorption of heat and the protection of the burner assembly and other elements located upstream of the combustion zone.

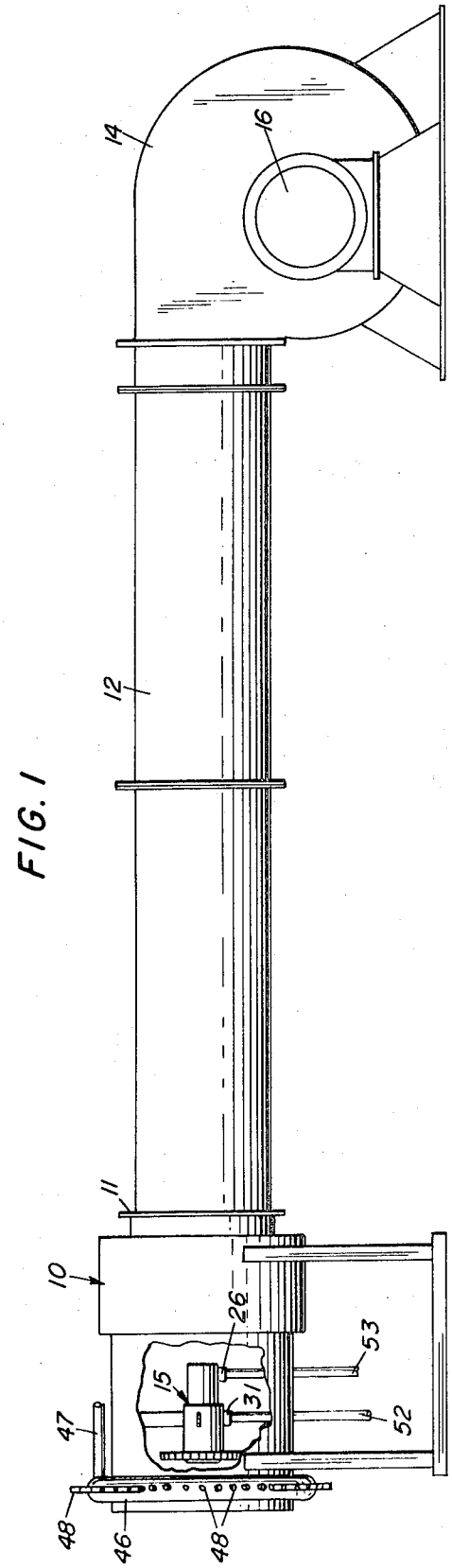



FIG. 1

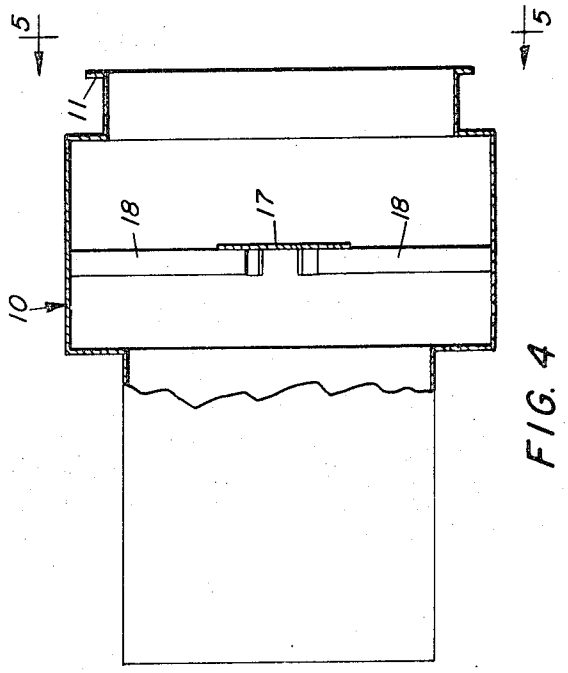



FIG. 4

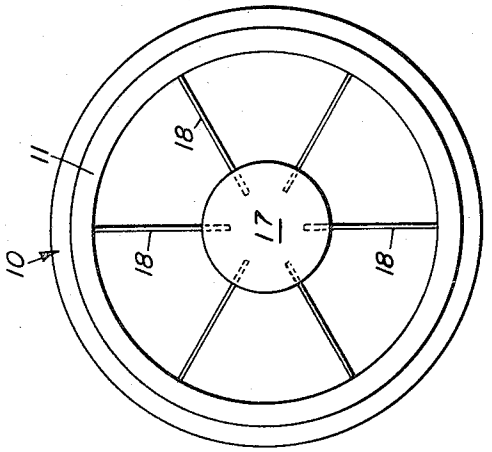



FIG. 5

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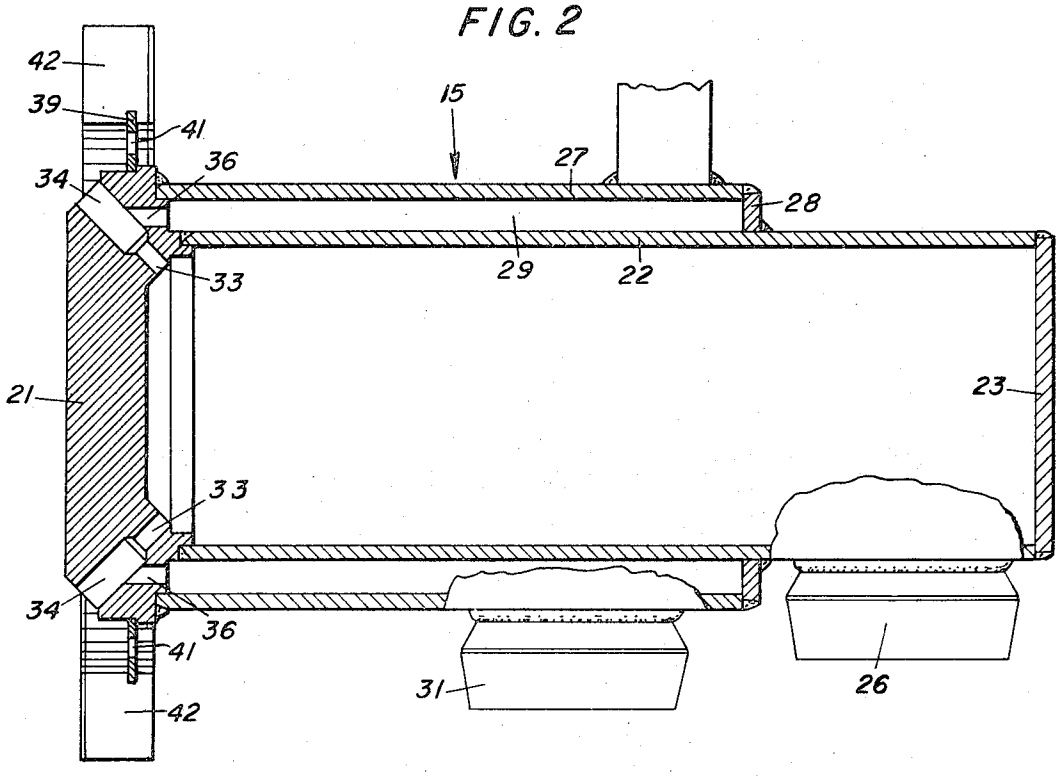
FIG. 2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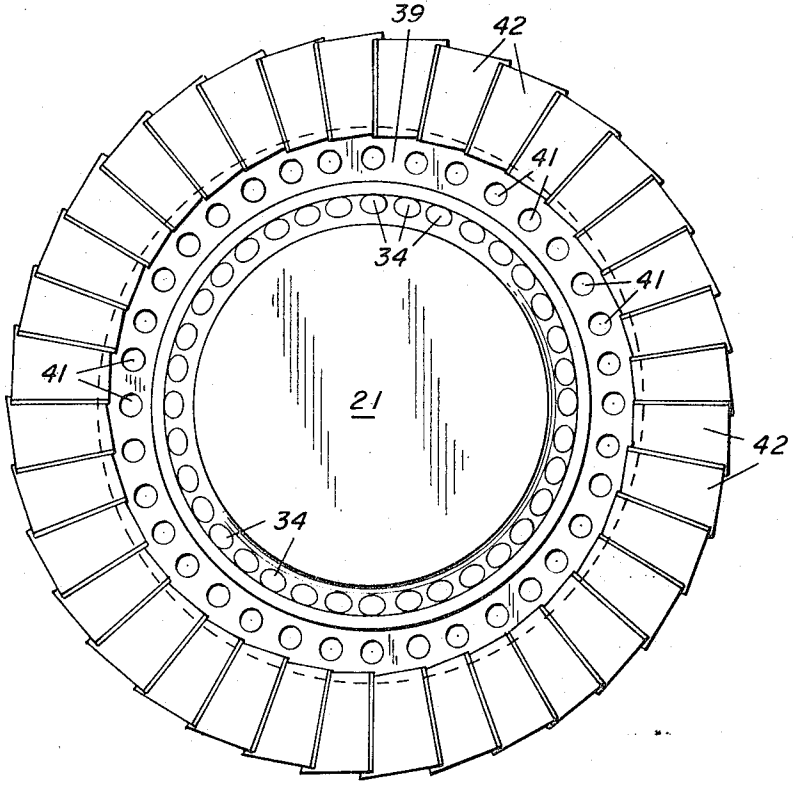
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FIG. 3

# BURNER ASSEMBLY FOR COMBUSTION OF OIL

The present invention relates to a burner and equipment for the combustion of crude oil and the invention more specifically pertains to a burner assembly which is capable of burning such liquids at the rate of as many as 6,000 barrels per day and at a rate which develops as much as a billion six hundred thousand British Thermal Units per hour.

In the course of drilling and testing of offshore wells, there are occasions when crude oil is spilled onto the water. The oil floating on the water is undesirable and it is an object of the present invention to provide a burner assembly which is capable of the combustion of crude oil and at rates of as much as 6,000 barrels per day with the combustion taking place in the atmosphere and to thereby reduce the quantity of oil that may spread over the surface of the sea or water.

Another object of the invention is to provide a burner assembly wherein crude oil is broken into small droplets and released for burning with the burner assembly equipped with means for maintaining ignition of the burning fuel.

A still further object of the invention is to provide means for directing a current of air over the burner so as to cause the flame to move downstream with the current of air and thus provide a structure which is capable of directing the heat developed by the combustion away from a drilling rig or platform and with the air-developing turbulence in the burning fuel to accelerate the rate of burning of the oil.

Another and further object of the invention is to provide apparatus which serves to develop a screen of water immediately upstream of the burner head to provide for the absorption of heat and the protection of equipment and personnel upstream of the combustion zone.

Other objects and features of the invention will be appreciated and become apparent to those skilled in the art to which the invention pertains as the present disclosure proceeds and upon consideration of the following detailed description taken in conjunction with the annexed drawings wherein an exemplary embodiment of the invention is disclosed.

In the drawings:

FIG. 1 is a side elevational view of a burner assembly embodying the invention.

FIG. 2 is a longitudinal sectional view of the burner head.

FIG. 3 is an elevational view of the downstream end of the burner head.

FIG. 4 is a longitudinal sectional view of the housing which encases the burner head.

FIG. 5 is an end elevational view taken on the line 5—5 of FIG. 4.

The invention pertains to apparatus for the combustion of crude oil and includes a structural arrangement for insuring atomization of such oil and the continued kindling of the oil droplets and structure shielding portions of the burner assembly from heat released downstream of the burner head.

Referring to the drawings, there is shown at **10** a housing in which the burner head **15** is mounted. The housing is connected at **11** to a relatively large duct **12**. A fan **14** of large capacity and desirably of the centrifugal type is mounted on a suitable base. A motor **16** drives the fan and supplies air into the duct **12** and for movement through the housing **10**. A disc-shaped baffle **17** (FIGS. **4** and **5**) is mounted in the housing **10** and supported by a plurality of radially disposed arms **18**. The baffle **17** shields the upstream end of the burner head **15** from the current of air moving through the housing **10**.

The burner head **15** is best shown in FIG. **2** and includes a relatively thick disc-shaped plate **21** which forms the downstream end of the burner head. A tubular member **22** joins the plate **21** adjacent the periphery thereof and is desirably welded thereto. The upstream end of the tubular member **22** is closed by an annular plate **23**. A conduit fitting **26** is provided for admitting a gaseous atomizing medium into the burner head **15** and into the tubular member **22**. A sleeve **27** embraces the forward portion of the tubular member **22** and joins the peripheral portion of the plate **21**. The upstream



end portion of the sleeve **27** joins the perimeter of the tubular member **22** as indicated at **28**. The sleeve **27** is of greater diameter than the tubular member **22** and an annular space **29** is provided around the periphery of the tubular member **22**. A conduit fitting **31** mounted on the sleeve **27** is for the purpose of admitting crude oil to the annular space **29**.

A plurality of ports **33** are formed in the plate **21** through which the gaseous atomizing medium may escape. These ports **33** have their axes aligned with the axes of discharge openings **34**. The openings **34** are of larger diameter than the ports **33**. Apertures **36** which are equal in number to the discharge openings **34** provide communication between the annular space **29** and the discharge openings **34**. The gaseous medium escaping through the openings **34** serves to draw oil from the annular space **29** into the respective discharge openings and to break the crude oil into small droplets and propel it through the openings **34**.

A ring **39** may be welded or otherwise secured to the perimeter of the plate **21**. A plurality of apertures **41** extend through the ring **39**. These openings are circumferentially spaced from each other about the entire ring **39**. A plurality of vanes **42** are secured to the periphery of the ring **39**. Each of the vanes **42** is of rectangular shape. These vanes are disposed at an angle with respect to the plane of the ring **39**. Thus air moving through the housing **10** engages the vanes **42** which impart an angular component to the air adjacent the periphery of the burner head. The apertures **41** and the vanes **42** function to preserve ignition of the atomized oil which escapes through the discharge openings **34**.

A manifold **46** surrounds the downstream end portion of the housing **10**. A pipe **47** is provided for delivering water under pressure into the manifold **46**. A multitude of spray nozzles **48** are mounted on the manifold **46** in communication with the interior thereof. The water escaping through the nozzles **48** provides a screen which absorbs and carries heat away from the combustion zone and thus shields the housing **10** and the equipment upstream of the burner head from the heat developed by the combustion which takes place downstream of the burner head. The water screen makes it possible to locate the fan **14** much closer to the burner head without heat damage. The heat released during the combustion of 250 barrels of crude oil per hour is in the range of 1½billion British Thermal Units per hour so that the water screen developed by the nozzles **48** becomes an important part of the equipment. The air forced through the housing **10** is at a rate of about 100 feet per second and serves to force the flame in a direction downstream from the burner head **15**. Thus the flame may be forced to move away from an offshore platform or the like.

A number of pilots may be mounted within the housing **10** and in spaced relationship about the downstream end of the burner head. Crude oil is delivered through a pipe **52** which supplies the oil under pressure into the annular space **29**. A gaseous atomizing medium such as natural gas or steam or air is supplied under pressure into a pipe **53** and into the tubular member **22**. The gaseous atomizing medium escapes through the ports **33** and develops low-pressure conditions within discharge openings **34** adjacent the apertures **36**. The crude oil is thus broken into small droplets and is discharged through the openings **34**. Upon ignition the atomized oil burns in a zone downstream of the burner head. The air supplied by the fan **14** moves through the apertures **41** and between the spaced vanes **42** to create turbulence in the burning oil and thereby promote combustion. Water is supplied under pressure into the pipe **47**. The water escapes through the nozzle **48** to provide a screen of water vapor about the perimeter of the downstream end portion of the housing **10**. The water absorbs heat and shields the equipment positioned upstream of the screen. The heat absorbed by the water is carried from the vicinity of the burner head.

While the invention has been described with reference to particular structural features, it will be appreciated that changes may be made in the overall organization as well as in the components. Such modifications and others may be made

without departing from the scope of the invention as set forth in the appended claims.

What is claimed and desired to be secured by Letters Patent is:

1. A burner assembly for the combustion of crude oil comprising, a burner head including a tubular member into which a gaseous atomizing medium is supplied under pressure, means providing a closed annular space about said tubular member, a plate closing the downstream end of the tubular member and said annular space, ports in said plate for the discharge of said gaseous medium, said plate having larger discharge openings aligned with said ports, and said plate having apertures providing communication between said annular space and said discharge openings whereby the crude oil is drawn into said openings and broken into small droplets as it escapes from the discharge opening.

2. A burner assembly for the combustion of crude oil according to claim 1 including a housing surrounding said burner head in spaced relation, and means for forcing air through said housing over the periphery of said burner head.

3. A burner assembly for the combustion of crude oil according to claim 2 including a manifold carried by the housing adjacent the downstream end of the burner head, means for guiding water under pressure into said manifold, and nozzles carried by the manifold for releasing the water as a screen about the perimeter of the housing.

4. A burner assembly for the combustion of crude oil according to claim 1 wherein a ring is carried by the burner head adjacent the downstream end thereof, vanes carried by said ring for imparting an angular component to the air moving over the periphery of said burner head.

5. A burner assembly for the combustion of crude oil according to claim 4 including apertures in said ring circumferentially spaced from each other about the perimeter of the burner head.

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